E. B F. ROBINSON, B.A.

THE TRUE SPHERE OF THE BLIND.

BY

E. B. F. ROBINSON, B.A.,

PHILOSOPHY PRIZEMAN OF TRINITY UNIVERSITY IN 1893.

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PREFACE.

BLINDNESS, although of frequent occurrence in particular families, does not affect a very large percentage of the total number, so that nothing approaching a general interest is taken in the blind. As I have undertaken, then, to write and to have published a book which, by my own confession, does not deal with a subject of general interest, it seems to me that a few remarks regarding the aim of the work are necessary.

The chief aim of the book is set forth in its title. I believe "The True Sphere of the Blind" to be in those vocations which require mental activity rather than manual skill for their successful prosecution. By a careful psychological analysis I show that blindness renders possible a more intense mental life, and by an examination of the attempts to employ them at trades I find that, as a matter of fact, the blind are unfit for such pursuits.

The other important objects are: To furnish a guide to the correct way to deal with blindness and the blind, to point out the danger threatening the eyes of the people

through our educational system, and to name the conditions and plans upon which the amelioration of the blind depends.

This book is necessarily deficient in a variety of ways. The comparatively small extent of my own experience, and the almost total lack of reliable statistics and information, render it difficult for me to be exact. There are very few works dealing with the subject, and these few are too old to be more than of historic interest. I acknowledge indebtedness to the late Dr. Armitage's excellent work on "The Education and Employment of the Blind;" to Levy's book on "Blindness and the Blind;" to the articles on "Blindness" in the various Encyclopædias; and for my chapter on the "Diseases of the Eye" to Dr. Minor's article on "Blindness," in the Reference Hand-Book of the Medical Sciences. For my account of the American institutions, I have relied mainly on their official reports. In my "Psychological Analysis" I have followed the order of treatment of the subject in Professor John Dewey's "Psychology," and I have also been indebted for some valuable suggestions to Professor Mark Baldwin's "Psychology."

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The True Sphere of the Blind

PART I.

THE PSYCHICAL LIFE OF THE BLIND.

CHAPTER I.

GENERAL NATURE OF BLINDNESS AND ITS TENDENCIES ON THE LIFE OF THE SOUL.

FOR centuries blindness was considered the saddest misfortune by which men might be overwhelmed. As a punishment it was more feared than death, and was inflicted on those for whom death was thought too mild a sentence. But men have learned to turn to account their very imperfections, and blindness, even, has lost half its terrors. There are few now who would not prefer it to death. At the time of Valentin Haüy, however, the condition of the blind was enough to fill men with alarm when threatened by this affliction. The following extract, taken from "The Encyclopedia Americano," shows in what a

deplorable state the blind were when Haüy began his work, and what reason men had to think death a less evil than blindness:

"At the annual fair of St. Ovide, an innkeeper had collected ten poor blind persons, attired in a ridiculous manner, and decorated with asses' ears, peacocks' tails, and spectacles without glasses, to perform a burlesque concert."

Great progress has been made in improving the condition of the blind since Haüy's time. The extent of this progress may be well shown by contrasting with the foregoing extract the following, taken from a recent report of the Perkins Institute and Massachusetts School for the Blind:

"While the audience was gathering, Henry R. W. Miles, one of the graduating class, played, for an organ prelude, Bach's great Fugue in G-minor. Then the regular programme was opened with the overture to Auber's 'Fra Diavolo,' played by the school band; played—as everything the children do is done—so exceptionally well as to draw forth the heartiest applause.

"Two maidens then gave an illustration of reading by the touch.

"A trio of young boys gave an exercise in botany and zoology, standing in front of tables bearing a bean plant in various stages of growth, specimens of seaweed, coral, and a stuffed body, and portions of the skeleton of an owl; each one in turn gave a little object lesson upon the materials at hand, speaking with a clearness and assurance which seeing children so often fail to attain.

"A duet for alto horns, from Bellini's 'Norma,' was most acceptably played.

"An exercise in physiology was an exceedingly interesting presentation by three little girls, of the nature of the human nervous system, which they illustrated by wooden tablets, bearing representations of the brain, spinal cord, etc., moulded in relief from clay.

"The next number was a Sloyd exercise, given by Emma Carr, Jennie Foss, and Edith Thomas; the latter, one of the three scholars, being deaf as well as blind. The first two little carpenters, standing at their benches, showed towel rollers which they had made, and explained how they had set to work with tools and measurements to produce the results. Little Edith's work was a paper knife, the manufacture of which she explained with her pathetic finger language, and then the three small workwomen, with planes and saws and vices, etc., demonstrated in practice what they had previously explained.

"The first part was brought very prettily and musically to a close by a chorus of female voices, 'Sparrows' Twitter,' sung in sweet, clear voices, and with spirit and expression.

"In the second part the children of the kindergarten led off with a most agreeable surprise, by giving an interesting illustration of work and play, called 'The Blacksmith.'

"Following these came a quartette for male voices, 'Farewell,' of which both words and music were composed by Henry R. W. Miles, and was followed by

the gymnastic and military drill exercise, which yearly proves so attractive, and even wonderful, to the spectators. H. R. W. Miles gave the valedictory, which was well thought out and clearly presented. Towards the end of the exercises the Rev. Andrew P. Peabody, D.D., presented diplomas to the graduates. . . . . The exercises came to a close with a chorus for all the voices, which was finely sung."

It is needless for me to dwell on this contrast. The difference between the treatment of the blind of Haüy's time and those of our own day is forcibly brought out by these extracts. I have quoted so much of the Boston report because I believe that the public are greatly interested in such performances, and because it is peculiarly typical of the way in which the blind of the special schools are treated. I shall have more to say of this treatment further on.

Blindness is a somewhat general term, and, consequently, very difficult to define. The variety of uses to which the word is put renders every definition lame and imperfect. Strictly speaking, the term means want of sight; but as sight is an equally broad word, this definition helps us little. Probably the best way to deal with the word is to qualify it by some such adjective as mental, moral, physical, according to the form to which the author alludes. Of course, in this work, when the word occurs, it means physical blindness, unless accompanied by some qualifying attribute. The drawing of such distinctions may seem to some a sort of unseemly levity, but I can assure the reader that I was never more in

earnest. The confusion arising from the misinterpretation of the meaning of this word *blindness* is considerable. I have an instance in my mind at this moment, and I am likely to be reminded of it the very next time I take a walk with one of my blind friends.

The instance to which I refer is one of Christ's sayings, being part of the 14th verse of the 15th chapter of St. Matthew's Gospel: "And if the blind lead the blind both shall fall into the ditch." Now, anyone at all familiar with the spirit of Christ's teaching, not to speak of any knowledge of the context of this saying, will understand that the blindness to which He refers is not physical. In these words we have an example of Christ's favorite method of teaching —by parables. In the passage in which this saying occurs Jesus is pointing out the difference between outward and inward purity. It is needless to urge this point further, a glance at the context will suffice to show that moral blindness is meant. If this language is taken literally, it is not strictly true, because when the blind lead the blind both do not fall into the ditch, but only one of them, sometimes the leader and sometimes the led. I know this to be a fact from my own experience. It does not do, however, to push a metaphor too far. If we take this saying as it is evidently meant, then no exception can be made, as it is certain that the morally blind cannot guide aright.

Returning to the primary and literal meaning of the word blindness, if we restrict it to the state of

being absolutely without sensations of light, a very small number of persons could be said to be blind. There are many who perceive light to whom this perception is not of the slightest practical use. Where, then, is the line to be drawn between the sighted and the blind? In my opinion Dr. Minor, in his article on "Blindness" in the Reference Handbook of the Medical Sciences, has answered this question correctly. "All those may be called blind," he says, "whose vision is less than 1/200, that is, inability to count fingers at the distance of one foot." But Dr. Minor somewhat mars the completeness of his definition by adding that such individuals have to be led around. Such individuals do not have to be led around. The friends who do lead such individuals around, not only trouble themselves unnecessarily, but also do those whom they assist a positive injury. The blind should be made to find their own way about. What Dr. Minor ought to have said was, that such individuals must employ some guide in locomotion other than sight. With this alteration, Dr. Minor's definition is satisfactory, and I adopt it. He, however, assigns no other reason for drawing the line at this point than that already noticed. This reason stated in its correct form is, that such individuals have to depend on senses other than sight for guidance in locomotion. To this reason I add, that persons whose sight is more than 1/200 are able to follow certain occupations by means of their sight, while persons whose sight is less than this amount are obliged to depend on the other senses in following such vocations. For example, a

person whose sight is greater than this amount would probably be able to read music by sight, while an individual with less must read it by touch. In fact, I call all those people blind who are obliged to follow their vocation without the aid of sight. The point where sight ceases to be of any practical value in this way is found to be about 1/200, or inability to count fingers at the distance of one foot.

Blindness may be generally defined, for my purpose, as a condition under which people must make their way in the world without the aid of sight. Such individuals must not be led around. It is fatal to their own happiness, and causes unnecessary sorrow and irritation to their relatives and friends. I am insisting on this, the distinction between my view and that expressed in Dr. Minor's article; not because I wish to seem critical, but for this reason, in that in stating that the blind have to be "led around," Dr. Minor gives expression to an opinion held almost universally. To my mind, future progress in bettering the condition of the blind depends altogether upon the degree of self-reliance, self-respect, and independence which the blind themselves can be made to feel. It is, no doubt, a fact that the blind are "led around," but it is a mistake to say that they have to be. In the chapter on "Locomotion" will be found a detailed account of the way in which the blind show that such individuals do not have to be "led around."

What is the nature of blindness? Is it a terrible misfortune, a sad calamity, or is it a blessing? We

are told that all misfortunes are blessings in disguise, and I must confess it seems so. For hundreds of years blindness has been, and, by many, is still thought, a great affliction. There are many, too, who think that people are made blind, and otherwise afflicted, to restrain them from committing great crimes. This is a curious philosophy and comforting, —that is, to apply to other people's misfortunes. In my own experience I have found that the blind, at all events, will have none of it. Indeed, I have known the advocates of this philosophy to complain most bitterly when told that certain of their own afflictions were all for the best. There is, no doubt, a law of compensation—when one gift is taken away another appears—but it must not be forgotten that when one set of temptations is removed another set arises. The truth is, so it seems to me, that there are places in this great world which can only be filled by blind persons, else there would not be anybody blind. In the history of philosophy, art, and science, the blind have filled many gaps, and in the ordinary every-day life the blind generally find a place, and make useful citizens. It is now pretty generally agreed among philosophers that man is in part the maker and in part the product of his time, circumstances and environment. The eighteenth century of French literature is said to have been more the age of Voltaire than any other period in any literature can be called the age of any one man. Yet in the transition to this period, in his own time, in the condition of the French court, government, priesthood, and people we

have a set of circumstances well calculated for the production of such a man as Voltaire. On the other hand Voltaire, by the versatility of his genius, brilliancy of wit and sting of his sarcasm, contributed powerfully to hasten the great French revolution. Great men are more the makers than the products of their time, while ordinary persons have not the strength to transcend, to be in advance of their time, and are more products than makers of it. In this fact lies the misfortune of blindness, few limited by it have the courage to make their environment, and are consequently its products. It is in improving this environment then, that progress is to be made in ameliorating the condition of the blind.

It is unquestionably a fact that in proportion to their numbers that more blind men have attained distinction in certain arts and sciences than have the sighted. To what is this due? Can it be reasonably held that so many men of great ability have been made blind in order to preserve the balance of power, as it were, to limit them in order to compensate others? Is it not more reasonable to suppose that their blindness was in some way connected with their success? If it can be shown that such is the case then blindness cannot have been a misfortune to them, then, also, looking at blindness from the teleological point of view the existence of it is a necessity, an integral part of the plan and order of the universe. Without blindness God could not impart some portion of his fullness unto men. It must always be remembered that, having sight or being blind, like

having wealth or being poor, like having strength or being weak, may be either a blessing or a curse according to the use to which it is put by the agent, and may be either a good or misfortune according to the circumstances in which the agent finds himself; yet these circumstances may often be so altered as to change what seemed a misfortune into the greatest blessing.

I believe that an analysis of the psychical life of the blind will account not only for the fact that so many great men have been blind, but also that it will prove that the true sphere of the blind is to assist in those tasks which require reflection rather than action for their execution. The blind should follow those pursuits which depend on the brain and not on the hand. They should earn their right to citizenship by virtue of what they know, not for what they do. It is in the professions, in the arts and sciences, in the larger operations of the commercial world that the blind should be trained, not in the trades where their time is lost and their labor unremunerated even under the most favorable circumstances. In those professions, arts, and sciences which the blind have entered many of them have won considerable distinction, as I have already said. Some of them, such as Fawcett and Saunderson, hold the highest rank, while few fail altogether.

In order to find out the general tendency of the effects of blindness upon the life of the soul it is necessary to ascertain what blindness means from a psychological point of view. For the soul the exter-

nal world is a world made out of sensations. One of the chief ways in which the soul is affected by the external world is through the excitations of the optic nerve. In blindness this most fruitful source of sensations is either partially or totally closed. How does this loss affect the life of the soul? Before going farther I must pause to notice a difference in psychical life between the totally and partially blind. By partially blind I mean those whose sight ranges from the mere perception of light to 1/200. It has often been a source of wonder to the instructors of the blind why it is that the merest perception of light is so highly prized by those who possess it. The explanation of this is, I think, that this mere perception of light seems to those who have it to connect them in a real way with the sighted world. I have known some of these persons to say that they were not blind, only short-sighted, and indeed they were very short-sighted. Nevertheless these people are almost invariably more energetic and more like ordinary persons than those who have never seen the light of day; they seem to be more in harmony with their surroundings. This fact has also some psychical importance, but in a short work like mine it is impossible to notice it particularly.

The general tendencies of the effect of blindness upon the psychical life is to intensify and strengthen all those mental activities which depend more for their existence upon the internal and higher processes of knowledge than on the external and immediately sensuous elements. The reason for this will be at

once apparent when it is remembered that the sense of sight carries with it the power to see and the way to be seen. Even for the most intelligent people the immediately sensuous world has its attractions. There are few like the celebrated German philosopher who left one of his shoes stuck fast in the mud and walked on oblivious of the accident, undisturbed in his meditation. The blind are not exposed to the distracting sensations to the same extent that the sighted are. A strange dog, a pretty face, is not so likely to interrupt their chain of thought. Thus blindness clears the way for a more intense mental life.

It is to be regretted that there are cases which seem to militate against this theory. Some blind men lead the most abandoned lives and are guilty of the worst of crimes. Instead of being evidence against my position, however, this serves only to strengthen it. In these cases the lack of food for the intellectual life has caused the passions to become greatly intensified. Where this is not the case it will be found that the vicious tendencies which assert themselves are related to blindness as causes, and not as effects. As a general statement it is not true that the blind are more vicious than any other class, while it is true that their intellectual development is generally greater in proportion to their numbers.

Man is endowed with a certain amount of energy, and ordinarily this finds an outlet in the pleasures obtained through the eye. In the blind, however, it is forced back into the higher mental activities. Instead of tiring themselves in the pleasures of

sight-seeing, the blind grow weary in the world of thought, memory and imagination. Sensations are elementary consciousnesses, psychical units out of which knowledge is built, and consequently any great loss of this material of knowledge is bound to affect not only the knowledge of the external world, but to react upon the higher mental processes themselves. The blind can form no judgments, therefore, of anything which depends altogether upon the eye for its material. It is only where this material can be got unaltered in its nature through the other senses that the judgment of the blind is of any value. They can form correct notions of equity, right and justice, of music and literature, and of all questions relating to mental, moral and political science. How much human happiness depends upon such arts and sciences, how the perfect ideal of life forms the end to which human effort ever tends, the ideal of personal freedem preceded long enough the realization of it. All such matters are well-known facts to thinking men. The time has almost gone by when the work of the schoolmaster is thought unproductive, and the world is beginning to realize that the more it advances in knowledge the less it will suffer. It is necessary, therefore, that while some should toil with their hands, others should work with their brains. It is to this latter class I conceive that the blind belong. Not so much because they are unfitted for manual labour, but from the nature of their limitation they are peculiarly adapted to follow the intricate windings of a mental labyrinth. The

blind are undistracted, undisturbed in the midst of the varying petty details of the visible world. No matter where the blind man be no chance stroke of the eye can call up an irrevelant chain of associations. He is exposed to the attractions and distractions of the remaining senses, but these are simply obtrusive enough to keep the mind from stagnating altogether. From all this, *a priori*, the blind should have a mental life different to, and higher than that of the sighted, different because of the difference in the sensuous material, and higher because of its depending upon the inner psychical processes. Does not the careers of such men as Holman, Huber, Milton, Saunderson and Fawcett constitute *a posteriori evidence* in favour of my view. A short paragraph on each will make this plain.

Homer.—There is a tradition that Homer was blind. But belief in this tradition as well as in every other concerning the author of the greatest poems of Greece and of the ancient world, has been shown to be without foundation. There is simply no evidence that there ever was such a man as Homer at all. It is idle, therefore, for me to talk of the effect of blindness upon his work. Nevertheless I rejoice that there are yet some who defend his personality. I like to think of Homer as tradition pictures him—poor, blind, and reciting his verses for bread. Disintegrating criticism may have shown him never to have been, but it will be long before his name disappears from the common speech of men.

Milton.—"Paradise Lost," another of the world's greatest poems, is attributed to a blind man and here the rude hand of disintegrating criticism may not disturb us. The effect of Milton's blindness upon this great work is distinctly marked. The wonderful imagery and stupendous grandeur of the poem are creations of the night. Its descriptions are magnificently incomplete and lack that keen observation of details noticeable in his earlier poems. Nor can this difference be attributed to the difference between the efforts of the youth and the work of age. But it is indicative of great change from an environment of light to that of eternal darkness.

Milton is one of the grandest characters in history. He yielded up his sight at the call of duty. He was writing "The Defence of the People of England." Told by his physicians that the price at which the world would buy that book was his blindness, Milton replied, "Is it so? Then must the sacrifice be made." The book was finished and with the consequence foretold. For the rest of his life Milton bore his misfortune with meekness and fortitude, accepting it as the consequence of his own act done in the discharge of his duty—"angels can do no more." The story of Milton's life has been often told, yet the nobility of his self-sacrifice and its influence upon his immortal work are seldom sufficiently noticed.

Saunderson.—Nicholas Saunderson, a celebrated mathematician of the eighteenth century, lost his sight when six months old. He was educated first at

a free school and afterwards by private tuition. But, unfortunately, the methods employed in his education have not been preserved. At the age of twenty-three he went to Cambridge, where he delivered a course of lectures on optics. Six years later, on the recommendation of Newton, he was made Lucasian Professor of mathematics in the University of Cambridge, a position which he filled for more than a quarter of a century with credit to himself and to the advantage of Newton's theories, the fullness and significance of which he was one of the first to realize. His mathematical works are among the best of that time.

Besides showing to the world that a blind man could discharge the duties of an office once held by Newton, Saunderson, in many other ways, was a remarkable illustration of how the blind can triumph over their limitation. He was a good classical scholar and listened to the reading of Latin and Greek books with a full comprehension of their meaning. His touch was so delicate, and his knowledge of the specific gravity of metals so accurate, that he could detect counterfeit coins that had baffled sighted experts. His sense of hearing enabled him to locate himself by the sound of his footfall. By his facial sense he could distinguish a fence from a house at the distance of twenty yards. His notion of space was so definite that he was accustomed to draw diagrams on the blackboard for his students. But, most wonderful of all, though totally blind, he was able, it is said, to tell when a cloud obscured the disc of the sun.

Huber.—That the blind should succeed as mathematicians is not strange when we consider the abstract nature of the science and the peculiar character of their limitation. But natural science depending, as it does, upon actual observation and experiment might be thought beyond them. Yet, in Francis Huber (born 1750, died 1831), we have an instance of a blind man, not only succeeding as a student of natural science, but actually adding to its stores of knowledge, and that, too, in a department where it might be thought eyes could not be dispensed with at all. In early youth Huber lost his sight as a consequence of exposure. At first this misfortune overwhelmed him, as he feared that through it he had lost the woman he loved. The lady's parents were bitterly opposed to her union with the blind youth. "But what," says Milburn, in speaking of Huber in this very same connection, "is parental hostility, or toil, or privation to a generous woman, when to the throb of affection is added the claim of sympathy. His infirmity insured him the prize, and that won, he was made happy for life." After their marriage his wife became his reader, amanuensis, and observer. "My blindness," said Huber, "is not so much of a calamity after all. . . . To me my wife is always young, fair, and pretty; there are no grey hairs, crowsfeet, and wrinkles, and that is a great matter." The true philosopher finds good in everything.

The study of bees was the branch of natural science which attracted Huber. He made many discoveries regarding the social organization and habits

of bees, and cleared up many points respecting details of their life which previous observers had failed to explain. In fact, since Huber's time nothing of importance concerning bees has been brought to light, so thorough was his work.

Holman.—Augustin Thierry, W. H. Prescott, and Francis Parkman are all three great historians whose work was done without the aid of sight. Many others might be mentioned who have risen to distinction. But enough of men of art and of science, and let us notice another sort of man. Lieutenant James Holman (born 1791, died 1857) entered the naval service in boyhood, and was constantly afloat until 1810. Owing to an illness which resulted in blindness he retired from active service, and was made a Naval Knight of Windsor. Wearying of the almost monastic seclusion of that foundation he took to travelling. He journeyed all over the world; Europe, Asia, Africa, America and Australia were the scenes of his wanderings. He prepared from his journals of travels a book entitled, "A Voyage Around the World," which was well received. As Holman frequently made extensive journeys alone and unattended there should be no question of the blind having to be led around. Holman was one of the greatest travellers of his day and generation.

Fawcett.—In recent times Cambridge has had another eminent blind professor, Henry Fawcett (born 1833, died 1884). In early life he became ambitious to enter Parliament. His position, enthusiasm and

accomplishments seemed to warrant high expectations. But when twenty-five years old, in September, 1858, while out partridge-shooting a stray shot from his father's gun pierced his eyes and destroyed sight almost instantly. For a time he lay prostrate under this heavy misfortune, but a wise word from a friend roused him from his lethargy and hopelessness, and he determined not to let blindness interfere with his plans. How well he succeeded is too well known to need repeating. He became a member of Parliament, a professor in Cambridge, an honourary LL.D. of Oxford, a Privy Councillor, and Postmaster-General of England. Every person should make a resolution not to allow blindness to mar his life, and though he may not succeed as completely as did Fawcett he will be the better for his resolve.

CHAPTER II.

SENSATION AND SENSES OF THE BLIND.

A STUDENT'S progress in the science of psychology depends upon the clearness with which he grasps the meaning and function of sensation. Sensations are the psychical units, so to speak, out of which the concrete forms of knowledge are built up. In sensation lies the meeting place of self and nature, in it the mind is not purely passive but relatively so to the higher processes of intelligence. Sensation, viewed as a process is the simplest form of the perceptive activity of the intellect. To the mind blindness means the withdrawal of all those sensations which can be got only through affections of the optic nerve. Our aim, then, is to show how the mind is affected by this loss, and also to find out how far it is successful in adapting the body to this abnormal condition. To do this it will be necessary to give some account of sensation and to examine the special senses. Since my ambition is not to treat of psychology, a task for which I am in no way qualified, I adopt the views of normal sensation and senses given in Prof. John Dewey's "Psychology." My object is simply to point out wherein the sensation and senses of the blind differ from those of people in the normal condition.

Prof. Dewey defines sensation as "the elementary consciousness which arises from the reaction of the soul upon a nervous impulse, conducted to the brain from the affection of some sensory nerve ending by a physical stimulus."

Consciousness itself is the abiding characteristic of self. It can neither be defined nor described, for it is presupposed in all definition and description. From the foregoing definition it is seen that sensation contains both a physical and psychical element. The presence of a physical stimulus is, so far as is known, absolutely essential to it, and without the reaction of the self no sensation arises.

The physical element in sensation is made up of two factors, the physiological and the extra-organic stimuli. The most of our sensations are due to affections of the organism by some thing external to it, at least those of most importance to cognition so arise. The various modes in which external bodies affect us are all reducible to one—motion. It is not the mere thing which affects us, but the thing in motion. For psychological purposes the world is a world of motions alone. Mechanical pressure, heat and electricity are extra organic stimuli resulting in general sensations, while vibrations of air and ether are stimuli which result in sensations to the special senses.

The extra organic stimulus must be transformed into a physiological motion before any sensation is possible. From the mode in which this transformation is accomplished the senses are divided into

mechanical and chemical; the sense of touch is mechanical, that of taste chemical. There are three stages in the physiological stimulus: First, the excitation of the peripheral organ; second, the conduction of the excitement thus produced along the sensory nerves to the brain, and third, the reception of and reaction upon this transmitted stimulous by the brain.

These changes in the nervous system are purely physical. We have as yet no sensation. A sensation is psychical, and the self must react upon this stimulus in order to produce it. A sensation, then, is an elementary consciousness incapable of further analysis. Sensations are not, as such, facts of knowledge. Knowledge always has objective reference, and in order to be formed into it sensations must be elaborated by the higher psychical processes. Sensations do not tell us what something is, they only tell us how that something affects us. Nevertheless, sensation is produced, not received, by the mind, and therefore implies activity. Sensations are usually classified according to their quality, as general and special. General, or organic, sensations arise from nerves of which the main work is the regulation of some bodily function, as digestion, respiration, etc., and only incidentally occasion conscious states. Sensations to the special senses are special, as light, sound, etc.

With the vexed question of the relation between the physical and psychical elements in sensation it is no part of my business to deal. Later I shall have to take up the charge of materialism sometimes brought against the blind. The psychological objection to

materialism seems to me sufficient to refute that theory. Matter and motion are facts to be explained just as any other facts of consciousness, and as consciousness is necessary to them they cannot be used to account for that to which they owe their origin.

The two classes of sensation, general and special, are connected: and the connecting link is the sense of touch. This sense, viewed either from its psychological or its physiological side is fundamental. Both for the physical organism and the psychical life, touch is the central sense. From a physiological point of view, we find that an organism possessing the lowest form of nervous system responds to stimuli of immediate contact only. Though different colors call forth different actions on the part of such an organism, there is no evidence to show that this is appreciated as difference of colour. There is no doubt, however, that this difference is felt in some way, and hence, it is believed that originally the sense of touch served in an undifferentiated manner for the reception of all stimuli. Moreover, as we ascend the animal scale, we find that each new sensory organ is developed out of that layer of the body which contains the touch organs.

Psychologically, motion is the sole stimulus of sensation, and motion can affect the body only by actual contact with it. Touch is immediate contact, and the other senses are adapted to different modes of contact.

Touch forms the connecting link between the general and the special senses; like the general, it has

no special organ, but is distributed over the whole body; like the special, touch gives rise to contact sensations, not incidentally but specially. Sensations of tickling and tingling connect touch with the organic sensations. That touch serves to some extent for the eye and the ear in the blind and deaf shows its affinity to the special senses. Again, in the general sensations the emotional aspect predominates, while in the specific sensation the cognitive aspect prevails. In touch the emotional and cognative sides seem to be equally strong.

In sensation the nerve organ must be adjusted to the stimulus by means of the muscular system, and the connection of tactual sensations with this system is most intimate of all. Touch is also the test sense. In order to assure ourselves of the existence of an object corresponding to a sensation received through another sense, we appeal to touch.

On account of its fundamental character and its connection with muscular sensation, touch is generally treated first, as separate from muscular activity; secondly, muscular sensations are themselves considered; and third, these two unite to form active touch.

PASSIVE TOUCH.—We are not concerned here to any considerable extent with passive touch. It is probable that in this respect there exists little difference between the organism of the blind and that of sighted people. It may be that the threshold of value and the threshold of difference are diminished, but as there have been no investigations in this direction this point is deduced from the nature of blindness itself. The

pressure sensations and the local signs remain unaltered; although, as the sensibility of most parts of the body is increased in blindness. The touch papillæ and local signs will generally be found more developed. As the difference threshold and threshold of value and local signs vary considerably in different individuals, this fact is of little importance.* As a rule, the sensibility of the touch papillæ depends upon the kind of work in which any particular person is engaged. Sensations arising from passive touch have little psychical value, though they are of considerable organic importance.

Muscular Sensations. — The physical stimulus here is the body's own exertion, the reaction of the organism against pressure from physical force. The muscular sense is active, the other senses are passive. The psychological importance of muscular sensations is that, in themselves, they give us a very accurate knowledge of the position and tension of various muscles, thus forming the basis of our knowledge of our own bodies, and of the discrimination of our own bodies from extra-organic bodies. The muscles, too, through these sensations are to some extent placed at the disposal of the will. They also form the means of adjusting the

*The threshold of value is the smallest amount of matter that can be felt. The difference threshold is the amount by which the threshold of value must be increased before any difference can be noticed by the sense of touch. The local signs are the points or spots on the skin which contain the touch papillæ.

other sense organs to their physical stimuli. The eye and the ear have each a carefully adjusted set of muscles. In hearing the muscular sensations enable the mechanism of the ear to be adjusted to the widest possible range of sound. These sensations form not only the connection between the organs of speech and those of hearing, but also that between sounds and certain regular movements, such as marching and dancing.

In taste these sensations keep the food in motion, and in smell the odorous gases. Together with auricular sensations they have been shown recently to give rise to that feeling of equilibrium of the body in space. Feelings of the rotation and general position of the head with regard to the body are given by the semi-circular canals of the ear.

My reason for pointing out, with what to some may seem unnecessary minuteness, the true function of each of the senses, is that many people have an idea that much of the knowledge which I show to arise elsewhere, has its origin in the sense of sight. Dancing, marching and position of the body generally are commonly supposed to depend on the eye. Now, though the eye aids materially in such exercises, it can be dispensed with, and, moreover, is not the basis of these movements at all. The blind can be taught to perform a quadrille without error, because in square dances each person must be at a certain place at a particular time, and the course of the movement is regular. When a blind person dances in a set, the other members of which are sighted, the very want of sight enables

him to give his whole attention to the movement, as he is necessarily cut off from the ordinary attractions of watching the doings of his neighbours and the wall-flowers. In this case the great trouble is that the sighted dancers often make mistakes which throw the blind man out in his reckoning. My own experience in dancing has convinced me that this form of amusement is not altogether suited to the blind. In schools and at home it should be taught for its physical benefits, but ball-rooms are two crowded, and one meets with so many wretched dancers there that such places should be avoided. I must add, however, that my training in dancing was not of a very high class, and that careful teaching might remove many of the difficulties with which I come in contact. It is not in dancing itself that the trouble arises, but in its surroundings. Once on the floor with a good partner and good couples it is not very difficult to dance, but these conditions are so very seldom filled that it is almost useless to look for them. Besides this there is another obstacle which, in a crowded room, often puzzle the sighted, that, namely, how to find your partner. This task is almost impossible for the blind.

Not only does marching form a part of the training of the blind in almost all of the institutions for the education of the blind, but in many of them military exercises are embodied in the regular routine. These exercises improve wonderfully the deportment of the pupils as well as serving to keep them in good health.

As to personal carriage and general position of the

body and its members I need say nothing; for, if the blind can dance and go through military drill it will be readily understood deportment would not be difficult for them to learn. I cannot leave this subject, however, without remarking upon the prevalent ignorance of such matters. I have been asked, and by those, too, whose education might have seemed to warrant hope of better things, how I managed to find my mouth when I wished to feed myself? Now, so far as I know, people when dining do not use a mirror, and how they manage to locate their mouths without it is to me incomprehensible. I repeat that I have been asked this question frequently, and, aside from its impertinence, I think it a display of the most disgusting ignorance imaginable. Thinking of the impertinence of this question I am led to ask, Why it is that when anyone has a physical misfortune people are always prying into the cause and all other particulars about it? It is not so when other misfortunes happen. If a man has lost a large fortune through no fault of his own, people do not cry it after him in the streets as they do when one has become blind or deaf.

ACTIVE TOUCH.—This union of passive touch and muscular sense is always present in normal life. It abbreviates all touch processes by multiplying the number of impression which can be had in a given time. It makes it possible to bring the object to be touched in contact with the most sensitive portion of the organ. Active touch is capable of making much finer discriminations than passive touch.

By running the hand over a body impressing and moulding it, we get the ideas of hardness and softness, elasticity and inertia, roughness and smoothness, etc. Sensations of successive points make us judge a body course or rough; continuous contact sensations lead us to pronounce other bodies fine or smooth.

These are the chief ideas got through active touch normally. It may be said that we do see roughness and smoothness, though hardness and softness are received through active touch. I answer that neither roughness nor smoothness are seen, but I shall explain this when treating of the theory of vision. The blind obtain far more ideas through active touch than these already noticed. By reason of necessity this sense is found in them in a highly developed state. Together with the sense of hearing, that of touch has most to do with making good the loss of sight. It is impossible to enumerate all the ways in which touch is employed by the blind; here I can only notice a few of the more remarkable. It is now many years since the blind learned to read by touch. We shall go into this fully when we come to treat of their education. I must say here, however, that by means of tangible print and the recent inventions for producing it, the blind have had the literature and music of the whole world brought within their reach. In all the mechanical arts and trades which the blind follow, the sense of touch must be relied upon mainly to replace that of sight. The extent to which touch is used in such vocations will also be treated further on. The majority of the blind can and do

read some form of tangible print, and those who do not are usually people who have become blind late in life, or others who follow occupations which deaden the touch papillæ and dull the tactual sense. The degree of sensibility required to read by touch is shown when I say that to normal touch a page of Braille placed under the hand gives rise only to sensation of roughness, while under the hand of a trained blind man it results in words and sentences.

Among the more ordinary uses to which the blind put the sense of touch are the threading of needles and the telling of the time. The former is more commonly practised by women and the latter by men. Needles are threaded by two methods. One is by looping a fine wire and passing it through the eye of a needle. The thread is then passed through this loop. The wire is next removed and the thread carried into the eye of the needle. This method is merely an ingenious way of enlarging the needle's eye. The other method is by means of the lips and tongue. It is much harder and requires a skill and delicacy not often found. Yet this method is used quite frequently by blind women. The touch papillæ of the lips are probably the most acute of all so that when employed we would expect to find its work of a very fine nature. This fact probably explains the practice of kissing. The blind also employ their fingers to tell time. A blind man has the crystal removed from his watch and determines the time partly by the relation between the hands and fixed points on the case, and partly by the angle between the hands

themselves. This operation does not require a very delicate touch, and I have known several sighted men who could tell the time by their fingers, not so accurately as the blind are able to do it, it is true, but within a few minutes of it, though.

In this connection I am reminded of an amusing display of ignorance that I met with once. I had taken out my watch in order to ascertain the time, when a by-stander inquired how it was done. I was under the impression that this question arose out of idle curiosity and not from any desire to learn, but be this as it may I told him that mine was an ordinary watch. "And do you," said he, "feel through the glass." I wanted to laugh but succeeded in smothering my desire. I replied that I did so, and that when I was in a particular haste I did not bother opening the watch at all but felt through case and all. He turned away and began to converse with a friend of his upon the wonderful achievements of the blind.

The blind are able to shave themselves. This requires no special delicacy of touch, as a sighted friend of mine constantly shaves himself in the dark. The blind are able, too, to blacken their own boots by the sense of touch. In fact, they can do everything in connection with performing their own toilet, and moreover they ought to be made to do it. The more the blind do for themselves the less other people will have to do for them and the less inconvenience blindness becomes.

What sensations are there, then, which the sense of touch cannot replace? Certainly not those resulting

from affections of the optic nerve, colours with its variations of tints and shades.

Some time ago I was led to investigate this question, and I came to the conclusion that the blind cannot tell colours by the sense of touch or in any other way. I had often heard of blind men who were said to possess this power. But knowing, as I did, that the blind are very much given to practical joking, I thought that this prevalent idea was due either to a blind man's joke or that it was a complete hoax. Several instances of the supposed possession of this power to discriminate colours have been brought to my notice recently, and my inquiry into them has led me to take another view of the origin of this idea. The blind who claim to possess this power are themselves mistaken. Instead of trying to impose on others they imagine themselves to be able to discriminate colours. Colours cannot be touched, though certain textures may happen to be of particular colours. To make my meaning clearer; in yarns, a grey or white yarn is generally coarser than a blue. It is a difference in the texture from which the difference in colour is inferred. I was led to this conclusion by a conversation with a blind friend of mine, a Mr. James Miller, who supposed himself to be able to tell colours, and I succeeded in inducing him to explain how he did it. My advice to any one who wishes to test this question, is to give to the blind man claiming to possess this power the painted slats used in matching colours, and I venture to say that his claim will fail to be supported. If by any chance this claim

should be made good, then there is no reason why it could not be taught to other blind persons and so throw open the enjoyment of painting to them. Even if a blind man could discriminate differences of colour by touch, it cannot be appreciated as difference of colour. In other words, red felt and red seen cannot be shown to be one and the same sensation. The practical advantages of being able to discriminate colours is not affected by this psychological difference, but it will be time enough to treat of these advantages when the possession of this power by the blind is proved. In an inquiry into it care must be taken to avoid imposters, to beware of the tricks of the blind, and to guard against any erroneous impressions that the supposed possessors of this power may entertain.

The part which the sense of touch plays in locomotion will be taken up in the next chapter.

SENSE OF SMELL.—The physical stimulus of smell exists always in the form of a gas; non-volatilizable solids and liquids do not excite it. Heat does not excite smell, and it is uncertain whether mechanical pressure and electricity are stimuli of this sense or not. The organ is the ending of the olfactory nerve in the upper and back part of the nostrils in the mucus membrane. All that is known about the mode of excitation is that it is some form of chemical action, and that the particles must move. The sensation itself belongs more to the emotional than to the cognitive side of our nature, and therefore smells are best classified as agreeable and disagreeable.

Smell is employed by the blind pretty much as it is by the sighted. The chief difference is that the blind use it to assist in locomotion. Various kinds of business places can be located by the peculiar odour which pervades their vicinity. A drug store, a tailor's shop and bookseller's place, each has an odour peculiar to itself. In passing along, an observant blind man can detect such places and guide himself accordingly. A particularly offensive smell apprises him of an open sewer, while an open drain has always an earthy smell about it. It is generally through carelessness that the blind fall into such places. The importance of noting these differences will be seen in describing locomotion.

SENSE OF TASTE.—The physical stimuli are electricity and mechanical pressure. Only bodies in a liquid condition are sapid. The organ of this sense consists of those portions of the tongue and soft palate provided with taste-buds. The sense itself is purely subjective, and by reason of its office, differs in no way in the blind from its normal condition. The fact that the sense remains is of considerable practical value, inasmuch as those occupations in which it is extensively used are by it kept open to the blind. Mr. H. L. Hall suggests that the blind might be trained as tea-tasters. The suggestion should be investigated by the trades instructors of the blind. Taste is the guardian of the physical organism, and has little to do with our psychical life. If its demands are not attended to, however, we are made painfully conscious of its existence. It has no intellectual

value, and is connected with the grossest of all vices—intemperance and gluttony. It is into these and other organic vices—organic and systemic vices—that the blind are in danger of falling, unless saved by intellectual food.

SENSE OF HEARING.—Electricity and mechanical pressure act as stimuli to this sense. Roaring in the ears is due to unusual pressure of the blood vessels. The specific stimuli are vibrations of an elastic, ponderable medium, within the limits of fourteen and forty thousand per second. The external and middle ear serve only to condense and transmit vibrations. The real organ of hearing is in the internal ear. The basilar layer of the organs of corti are thought to be a series of fine cords, stretched like harp strings, each with a definite rate of vibration, which rate depends upon the length and tension of the cord agitated. The organ for transforming the physical into the physiological stimulus is thus always attuned to some mode of vibration.

In the sensation sounds vary in intensity, pitch and tone-colour or timbre. The intensity of the sensation corresponds to the amplitude of the occasioning vibration. The wider swing of the vibrating particles shows its greater energy. This affects the nerve with greater force, and results in a more intense sound. Pitch corresponds to the rate of vibration. The scale of pitch is due to the specific connection between certain ratios in the rates of vibrations. Timbre is due to the form of the vibrations, and on this form depends the specific quality of the sound of

a body. Sensations of sound are made up of fundamental tones and partial tones. The partial tones combine with the fundamental tone and give to it a peculiar quality. The tone of a tuning-fork is simple or fundamental; all other tones are in integral-multiple ratio to the simple, that is, their rates of vibration are to that of the simple, as 2, 3, 4 are to 1. This is the physical basis of tone-colour. Why one rate of vibration should give rise to one kind of sensation and another rate to another kind cannot be explained. We know only that the mind has the power to respond to such stimuli in a definite and variable way.

It is held by some that noise and harmony are each unique, and occasioned through a different set of nerves. The fact that the capacity for appreciating musical discriminations and that for distinguishing noise bear no relation to each other, is cited as a proof of this theory. This means, I take it, that some persons are held to be without capacity to appreciate music. There is a general belief that all blind persons are musical. Now, though no doubt the love of music is greater among the blind, in proportion to their numbers, than among the sighted, it is not by any means true that all, or even a majority of them, are musical. The power to appreciate music is an acquired, and not an inherent, capacity, though no doubt this capacity is hereditary.

Musical ability has been generally regarded as a gift, and in the case of the blind a sort of providential compensation for the loss of sight. Though the theory that noise and harmony have each different

sets of nerves may have an element of truth in it, inasmuch as the nerves in a musician's ear differ from those in the ear of a non-musical person. Yet the nerves of the non-musical person require only development to be transformed into music-appreciating channels. The reasons which have led me to this conclusion are that the power to appreciate music is more common among the blind than among the sighted. Since I hold that Providence cannot be held responsible for, and a sufficient explanation of such a phenomenon, I conclude that blindness is in some way connected with it. To me this connection seems clear. Is it not that, in the blind, the auditory nerve is brought into greater use, and becomes of necessity more acute. Of course this explains only a fine discrimination in sound, not in harmony. But let us carry this analysis further. The increased acuteness of the auditory nerve leads to fine discrimination in sound of every kind. It is a physiological fact that all irregular and interrupted nervous activity seems to occasion pain. Would it not be natural for the mind, then, to avoid such irregular nervous activity and dwell upon those vibrations which give regular alternations of rest and activity, or harmony, and which result in pleasure. At any rate, in my experience I have known blind persons, and sighted people, too, for that matter, who possessed, to begin with, what might be termed no native talent for music, after years of training and practice, develop into pretty fair musicians. Of course such people never attain to that point of excellence to which those reach who have an

hereditary tendency for music. In further support of my theory, that the appreciation of music is acquired, and not native, I point to the fact that women, as a class, are more musical than men, simply because, as a class, they pay more attention to it. The expression, "a musical family," seems to indicate that it is pretty generally held that the capacity for music is hereditary. If there were a radical difference between a musical nerve and a noise nerve, then we would expect to find people absolutely without appreciation of music, such people are not found. Though for some people music has few charms, there are none who do not respond to some form of it. Music is a matter of taste or of a subjective nature. Some prefer Mendelssohn and Liste, while others find "God Save the Queen" and "Hail Columbia" more to their liking. This is simply a difference in development, not a difference in nature. The power to appreciate music is latent in every person. In some it is cultivated, in others it is not, that is all.

The blind employ hearing in several ways to a greater extent than the sighted do. They depend on it more in locomotion, and many more books are read aloud to them than to the sighted. This sense is in every way more acute in the blind, and it is this very fact which makes them better tuners than the sighted. This sense is employed in a greater degree than in locomotion in acquiring knowledge and in following occupations than is normally the case.

SENSE OF SIGHT.—General stimuli of this sense are electricity and mechanical pressure, specific stimulus,

light, or vibrations of an absolutely elastic medium, ether. These vibrations run from 451 millions per second (sensation of red) to 785 millions per second (sensation of violet). Below this range they give heat, and above it the actinic effect.

THE ORGAN.—The essential part of the organ of vision is where the optic nerve enters the eye and spreads in a fine net-work over the back of the eye. This net-work is called the retina, and is composed of nervous layers, the most important of which is the layer of rods and cones. The remainder of the eye is a system of lenses and refracting media, forming an inverted image of an external object upon the retina. There is also in the eye protecting portions for these parts, and a mechanism of accommodating muscles which enables the eye to adjust itself to varying distances. Where the optic nerve enters the eye there is a blind spot which is ordinarily filled in by the restless movement of the eye, and since the optic nerve does not enter at the centre of the retina, the blind spot of one eye does not correspond exactly to that of the other. The centre of the retina, or yellow spot, is the point of most acute vision. The very fine and powerful eye muscles turn the eye so that the stimulus shall fall upon the yellow spot.

There are two classes of sensations got through the optic nerve, and as this fact is of vast importance to the blind, since one class can be replaced while the other cannot, I have devoted a special chapter to the theory of vision; in it will be treated the sensations of the sense of sight.

THE TEMPERATURE SENSE.—The physical stimuli here are heat and cold, and the organ is the skin of the whole body, which is divided into spots of three separate kinds, neutral, heat, and cold spots. If a cold body is placed upon a heat spot, the mechanical stimulation produces sensation of heat, and a hot body on a cold, in the same way, gives a cold sensation. If either a hot or cold body is placed on a neutral spot, no sensation whatever arises. *Temperature.*—The specific organ of this sense is not known, but it is believed to exist in the true skin, and in some of the mucus membranes. This sense may be temporarily destroyed by a wound of any kind, but returns when the wound is healed. It is distinct from the tactile corpuscles, and from the organs of pain. The vague and emotional character of these sensations, together with its distributed nervous apparatus, forms the transition from the special sensation to the general sensation. Sensations of heat and cold are not two degrees of the same sensation, but are specifically different, and have separate organs.

General or organic sensation remains intact in the blind. They are sensations which may arise in any sensible part of the body, and are not usually noticed, these sensations are of vague and changeable character and contribute little to cognition. Pain and fatigue are sensations which may arise in any organ. Systemic feelings are sensations of the whole organism such as hunger and thirst.

I have now finished the comparison of the senses and sensation of the blind with those of the sighted. At least I have dealt with all those sensations and senses generally recognized by psychologists. There remains another sense, however, to be examined. This sense, I call the Facial sense. Perhaps psychologists may object to my treating the sensations got through the facial nerves as a distinct sense. Yet these sensations differ so widely from those got through the other sensory nerves that I believe myself justified in dealing with them as I do.

THE FACIAL SENSE.—The physical stimuli are heat and mechanical pressure. Whether electricity is a stimulus or not I do not know. The specific stimuli are vibrations of the air. The organs of this sense are certain sensory nerve endings which exist in the face, chiefly in the cheeks. The sensations themselves tell us that some extra-organic body is not far from being in actual contact with our physical organism. The range of this sense is very limited and its existence is usually ignored in normal life, these sensations are usually received through affections of the optic nerve, yet every one has noticed, when wandering about in a room in the pitch darkness of midnight, certain vague premonitions of danger, certain feelings of something that is about to happen, which bring the body to a standstill when heeded, and bring it into violent contact with something external to it when disregarded.

The blind dwell continually in what is practically the midnight darkness, as the mere perception of

light does not serve to enable them to avoid external objects. These vague premonitions which come so seldom to the sighted are constantly thrusting themselves upon the attention of the blind. Consequently by observation the blind find that warnings vary in intensity, form, and direction; thus they are gradually arranged into a perfect system of signs, which serve to some extent to guide the movements of the body. The intensity of the sensation depends jointly upon the size of the opposing object and its distance from the body. It is this fact which makes the systematization of these sensations imperfect, for a small object very near to the face may produce a similar sensation to a larger one more remote. Further, a body must be in a certain position before any sensation can arise from it. There must be a certain length and breadth opposite to and in the same plane as the facial nerves before a sensation arises; a cricket bat, held with its face to that of the blind, provided that the distance is not too great, produces a very fair sensation; but if its edge be turned to the same person it is probable that no sensation would arise at all. If the end of the bat were held directly opposite the cheek it is certain that no sensation whatever would be produced. A flat surface results in a more definite sensation than a round or oval one. The form of the sensation depends upon the position and movement of the occasioning vibration. The direction is determined by the part of the cheek most strongly affected. An object is located on one side or the other because the sensation is more intense in the one cheek than in

the other. It is through the facial sense that the blind have their ideas of bulk, distance, magnitude and direction enlarged to an extent which could never be reached through the other senses. These sensations play a very important part in assisting the blind to move about, but as this point must be fully explained in the next chapter it need not be dwelt upon here.

From a psychological point of view this sense might possibly be reduced to the tactual sense and temperature sense. It might be perhaps shown that these nerve endings, acted upon by atmospheric pressure, form the basis from which ideas of distance and magnitude could be inferred. But the reduction of this sense to some form of contact does not make it identical with the senses of temperature and touch, any more than hearing and sight are identified with them, because they can be similarly reduced. These sensations are not identical with those produced through actual contact from the very fact that no actual contact exists in their case. Moreover, the most sensitive parts of the body for the sense of touch are not those used in this sense. The hand has a very fine set of tactile nerves while it does not possess the power to determine bodies not in actual contact with it at all. On the other hand, the face, which possesses this power, is not very finely sensible of touch. The connection between the facial and the temperature sense is easy to explain, though their distinctness is somewhat difficult to show; but as the heat and cold spots cannot be simultaneously dominant, if they contained the facial

nerves there would be found great differences in the activity of the sense in different temperatures, such is not the case so far as I know. It is quite as active in all temperatures except in extreme cold. Many experiments would have to be made in order to work out the details of my hypothesis, meanwhile the fact remains that the blind possess such a power no matter what its true nature may be found to be.

This somewhat lengthy enquiry into sensation may have been tedious to some, but it is absolutely essential to a true insight into the capacities and mental life of the blind. Sensations, it must be remembered, are the result of psychological analysis, and have no real existence. Every concrete intellectual act is always one of intuition. Sensation is the work of a perceptive intelligence, and a lack of sensation certainly affects the whole structure of the intellect.

CHAPTER III.

ON LOCOMOTION.

THE difficulty of moving about without the aid of a guide is the chief obstacle in the way of the blind. Every blind man must surmount this difficulty before he can hope to enjoy all the rights and privileges of ordinary citizenship. The more completely any blind man succeeds in going about by himself, the less will such a person's treatment differ from that of ordinary people. It is of the utmost importance that some account should be given of the way in which the blind do manage to dispense with guides.

Locomotion is the power of moving from place to place. This word does not give so good an idea of the independent motion of the blind as that which they themselves apply to it—navigation. The methods employed by them for their guidance resemble those of navigation more than those of ordinary locomotion: but the word navigation hardly admits of being used in this connection. If the blind are to go about alone it is obvious that they must employ a new set of signs for their guidance. The characteristic difference between this new set and that ordinarily used is that, while the latter is general in its nature, the former is particular. A sighted man recognizes

any particular street or locality by its general appearance, by a collection of familiar objects; a blind man, on the other hand, may wander along a street on which he has been scores of times and yet have no notion of his whereabouts until he finds a certain stone, post, or other particular object which he knows to be located on a particular street. This change in guides to locomotion from general appearance to particular signs, is due to the fact that sight is the only sense which has the power to obtain the sensations necessary to the mind for the orderly and accurate arrangement of external objects in a very wide area. In less scientific language, sight has a more extended range than the other senses. Probably the best way of showing that men may go around without the aid of sight is by following the movements of a well-trained blind man, explaining his methods, pointing out the uses of the remaining senses, and accompanying my explanation with appropriate remarks. It would be difficult to do this in the form of a continuous narrative, so that I shall follow the psychological order in the treatment of the senses, beginning with the sense of touch.

THE SENSE OF TOUCH AND THE USE OF THE STICK.—Leaving his residence, the blind man selects that side of the walk which brings his right hand, in which the cane is usually carried, immediately above its edge. The right hand side, by a tacit agreement, is the side on which all people are supposed to walk, and I may say here that the blind would be greatly benefitted if this convention were always observed.

For the first two or three steps he taps the edge of the walk with his cane. His reason for this is to put himself in touch with the direction of the walk, in order that he may follow it in a straight line at a certain fixed distance from its edge. As he is in a quiet part of the town he walks rapidly and balances his cane immediately in front of him, keeping it oscillating like the pendulum of a clock, to guard his shins and knees from surprises in the way, such as wheelbarrows and baby carriages. If the blind man be an especially expert "navigator," like my friend, Mr. Stewart, a blind lawyer, he tucks his cane under his arm in the quiet places. It is amusing to read of the exploits of the blind man in the story books. He moves so slowly, and is forever tapping the edge of the sidewalk. I wonder what is his object in the tap, tap, tap. The expression sounds well and seems plausible, but to those who know, it is nonsensical.

The blind man attends carefully to the varying character of the pavement under his feet. In this he is guided, not so much by the sound, as is generally supposed, but by its feel. The close attention which the blind give to what they are treading on, is well brought out by the following incident. Mr. F. W. Johnston, the secretary of our association, and myself were walking down Ontario Street, Toronto, one evening. We had a small boy with us. Mr. Johnston had lost one of his gloves, and we were going back to a house where he thought that he might have dropped it. We were walking very rapidly, when I stopped suddenly. I had stepped on something. It

was the glove. I do not think that this was a mere coincidence, though if the glove had not been missing I would not have stopped, perhaps.

The blind man is moving rapidly along, when he strikes a tree with his cane, which flies out of his hand. But he does not stoop over to feel for it with his hand, as this would not only attract too much attention, but would not enable him to find it as quickly as he can with his feet. The feet have a large surface area, and very soon succeed in locating the stick; he stoops now and picks it up. The blind man resumes his way. He has been over the road many times, and hence certain unevenness in the planks, or a break in the granolithic pavement, are to him signs of his whereabouts, and often tell him that he is approaching to a step down or up, and at these points he slackens his pace, because there is nothing so jarring to the whole organism as an unexpected step of this kind For this reason, together with the absence of familiar signs, the blind move much slower on a strange street. Even yet, however, his gait is not as slow as that of the blind man in fiction.

Psychologically, the cane is but an extension of the tactual nerves in the hand. The stick and feet together enable the blind to move freely in a straight line in quiet places. My blind friends have had numerous dissentions as to what is the best kind of stick for them to use. In my own experience I have found that a steel rod covered with leather rings or washers is the best. This cane is very durable, not easily

broken, and moreover the steel transmits to the hand a stronger and more reliable sensation, or it enables the hand to report more accurately on the nature of external objects with which it is brought in contact. Steel appears to act as a better nerve than wood, so to speak. Its weight is against it, however, and prevents many from using it, as when they take hold of it for the first time it seems far too heavy. As soon as one becomes accustomed to it the weight is not noticed, and it is agreed by all those who have tried it that this stick is superior to all others for our purpose. Light malaca, bamboo or rattan sticks answer very well, but they are very liable to break, and a blind man without his cane is like a ship without her rudder. Heavy oaks and Irish blackthorns are sturdy enough, but they do not respond readily to extra-organic stimuli. Every blind man should be taught the correct use of the stick, and, above all, he must not keep pounding the edge of the walk, for while he is engaged in this delightful occupation he is sure to get himself into trouble—into too close quarters with a tree in the walk, a wheelbarrow, or some other thing of the kind. The only time he need pay any attention to the edge is when the walk is narrow and winding, or when it runs along on the top of an embankment or edge of a ditch ; then look out for it. The blind man should walk erect, as that is the only way he can keep in a straight line. He must not go wool-gathering, but keep his whole attention fixed upon his movements.

THE USE OF THE SENSE OF SMELL.—I have already noticed the use to which the blind put this sense. As there is some fish wanted at the house, the blind man wishes to find a fishmonger's. This is no difficult task, as such places have, to put it mildly, a peculiar odour about them. He has also another commission to execute. He wishes to find a jeweller's. Now, a jeweller's establishment has no distinct odour; in fact, it is almost free from it altogether. Now, though the sense of smell does not directly guide him to such a place, the blind man knows that this particular jeweller's place is the third door from a certain fruit store. Accordingly he finds the fruit store, which, by reason of its peculiar odour, is not difficult of location, and then counts the doors to his destination. Similarly, many other stores are located by remembering their situation with reference to certain odoriferous establishments, such as hotels, eating-houses and the like. Of course, the signs of this sense depend upon varying concomitants. The condition of the physical organism of the subject sometimes renders him less able to detect peculiar odours than at other times. The state of the shop also makes considerable difference. A clean, well-kept store with a small stock may have such a faint odour that the nature of its business cannot be made out. But the chief cause which operates to render these signs nugatory is the weather. In the summer, when doors and windows are thrown open, many business places send out an odour which is shut in in winter. In winter, however, some places retain their odour, as

even the open fanlights allow it to escape; but where this is not the case, a blind man has only to thrust his head into a door at a venture, and if he fails to detect the odour he may inquire for what he wishes to find. It may be added that at any time odours are more easily recognized indoors than outdoors. A dry goods store cannot be distinguished from a grocer's shop outside, but either can be made out and differentiated within doors. This is due partly to the fact that the excitant is less remote from the peripheral organ and partly to the increased sensibility of this organ itself.

The sense of taste contributes nothing to aid in locomotion, as we have already seen. Its subjective nature and the limited range of its operation render it unfit for any other purpose than that for which it is normally used. It is important to remember, nevertheless, that this sense remains intact in the blind.

Use of the Sense of Hearing.—Normally this sense is used little to assist in locomotion, but the blind depend upon it greatly for this purpose. Ideas of things in motion are normally formed from the sense of sight, but in the blind they are derived chiefly from that of hearing. The sense of hearing, as we have seen, enables us to locate sounds on the right or left side, according as the stimulus is more strongly felt in one ear than in the other. This fact is of considerable practical value to the blind. It is by carefully attending to the direction of the sound that they are enabled to cross streets with comparative safety. These sounds also become signs of particular

things. The rumbling of a waggon or the rattling of a cart differ widely from the rolling of a carriage or the whizzing of an electric car. The blind man reaches a busy street and wishes to cross it. He waits till it is comparatively quiet and then walks quickly over. Sometimes he finds it better not to cross at a corner, but in the middle of a block. The danger of this latter course is less so far as moving vehicles are concerned, but at such places horses may be standing on the other side of the road or the drain may be open. It is generally safe to cross at the corner. I say on the other side of the road, because any such obstacle on this side can be noticed either by the stick or facial sense. From the distinctness or faintness with which any vehicle is heard its distance and form may be to some extent determined. On very busy streets it will be found easier not to cross at its corners, but elsewhere, as there are not likely to be any vehicles unwatched or open drains unguarded on such streets. The intersection of two main thoroughfares the blind should not attempt to cross at all.

Bicycles are the chief obstacles in the way of the blind crossing streets with ease and security. These wheels are almost noiseless, and among other moving vehicles it is impossible to hear its approach at all. As in cities with a car service they travel on the "devil's strip," the very point of most extreme danger to the blind; they are really to be dreaded. The blind detest bicycles quite as much, if not more, than they do baby carriages. Bicyclists travel too rapidly for us to get out of their way, and baby carriages are

beneath the range of the facial sense. Those who propel such vehicles are moreover very inconsiderate. Nurse girls always select the most crowded parts of the city, and occupy a good deal more than their share of the walk. But the height of inconvenience is reached when three or four of these carriages are drawn up together and their propellers form themselves into a baby admiration society. No doubt baby should have an airing, but a main thoroughfare ought not to be used for this purpose. I do not consider such matters as foreign to my subject and I take this opportunity of asking the bicyclists not to call every one "a blind old fool" who fails to get out of their way, and of requesting those who have to do with baby's recreation to be a little more considerate of other people's rights.

Besides assisting the blind in crossing streets, hearing is like smell, and is extensively used in locating various kinds of business places. Music stores, machine shops of different kinds, and factories can be found by this sense. In a music store an instrument is going at times and sometimes the fine tuner is at work. The noise of a sewing machine indicates a tailor's shop, and the ringing of an anvil a blacksmith's forge. Woollen factories, planing mills, and flour mills have each their peculiar sounds.

Unfamiliar sounds in a well known quarter arrest the attention of the blind man, and he is often able to comprehend their meaning. Hammering and the ringing of trowels indicate the erection or improvement of a building; shouting may mean a fire, a row,

or other excitement. All such things should be given a wide birth by the blind, but they do not always do what they ought. I myself and two or three of my blind friends went to the great fire of the Osgoodby building in the beginning of the present year (1895) in Toronto, much to the amusement of our sighted friends. Though a fire is dangerous I must confess I find it very exciting. The crowd and their conversation, the varying accounts and theories of the fire's origin form an interesting study. A great tumult and uproar equal to that of any fire sometimes indicates an intercollegiate football match. When I was at college I took great interest in such events, and by attending to the shouting was able to follow the fortunes of the fight.

Sound also assists touch in determining one's whereabouts. From a hollow ring in the walk we know that we are in front of a certain saloon, while if we strike an iron fence with our cane we know that it surrounds a particular church, and so on through the whole category of establishments, each marked with its special sign. An iron post, wooden post, plank, stone, gravel walks, iron, board and picket fences are told quite as often by their sound as by their feel. By means of all these special signs felt, heard and smelt, there remain few places of business which can not be located. Psychologically, hearing, smell, and the facial sense must supply all the signs of locomotion used normally, because these are the senses by which nervous activity is set up by bodies not in actual contact with the physical organism. All those

ideas are thus enlarged which depend on such contact for their full realization.

THE USE OF THE FACIAL SENSE.—The chief use of the facial sense is to protect the body, or rather parts of it, from coming into actual contact with external objects. Its range is less extended and less accurate than that of hearing, and that of hearing is less extended and less accurate than that of sight. Hearing has this advantage over sight, that it is extended in various directions while sight is restricted to the straight line. The meaning of this is, in simpler words, that we can hear around a corner what we cannot see. The facial sense resembles sight somewhat in this respect, though it is not quite so much restricted to the straight line. It is impossible to arrive at any fairly approximate estimate as to what is the average range of this facial sense, chiefly because the blind refuse to be closely examined with regard to it. It is far more developed in some than it is in others. My friend, Mr. Stewart, possesses this sense in a highly developed state. The following is an instance of his use of it, which I discovered accidentally, and as everybody knows accidental phenomena are often more valuable than actual experiments. Mr. Stewart was asked by a blind friend of his how The Heintzman Piano Co.'s warerooms were to be found. He replied that just opposite to their door was a lane with a high building on one side and a lower one on the other. His friend laughed, and said that such signs might be of service to Stewart but that they were of no use to him. Mr.

Stewart employs such signs constantly, and in my opinion his use of them can be explained in no other way except by the facial sense. He is totally blind, and the signs he uses differ altogether from those employed by the sighted. From this instance Mr. Stewart's range of facial perception is found to be at least from sixty to seventy feet. Ordinarily, however, it is not found to exceed some ten to twelve feet.

Another illustration of the development of this sense is that of Mr. R. J. Pincombe, a blind tuner, of St. Thomas, who was a few years ago in the employ of the Reimer Piano Company. Walking down Jarvis Street one afternoon, he pointed out the trees on the edge of the walk, and from Gerrard Street to Wilton Avenue he never missed a tree, and this block is one of the longest in the city. I could give many more such instances, but these two answer the purpose. I may add, though, that I myself employ this sense. It is chiefly useful for moving about indoors, where the cane cannot be extensively used. It protects one from running into any object out of its usual place in a familiar house, and must be relied on almost altogether in avoiding accidents in strange quarters. The reason that the facial sense is not generally more developed among the blind is that their training has so long been in the hands of the sighted—people who know little about it, are consequently totally unqualified to develop it.

It is the facial sense which enables the blind to move in a straight line. The buildings and fences along the road are the excitants from which the direction is

determined. There is one great peculiarity about this sense to which I have not before called attention. This peculiarity is the form of the range of this sense. It protects the face from many a nasty blow, but it is of little use in protecting the rest of the body. Its range does not extend below the chin in front, and the hips on the sides, and in the back it does not appear to exist at all. It seems to depend for its action upon the position of the head, and this fact I think strongly suggestive of my special-sense theory. It is the peculiar range of the facial sense which makes tie-posts and hydrants such deadly foes to the blind, for they make no sound, are without odour, and do not excite sensations in the face; but alas! they can be felt, and we know it.

The various ways in which the remaining senses enable the blind to go about may be summed up thus: The sense of touch, with its extension, the stick guards the body, finds the path, and locates signs of a person's whereabouts; the sense of smell locates special places and gives warning of the proximity of dangerous places; hearing guides them among noisy throngs and across busy streets, besides assisting in the location of special businesses. The facial sense enables them to keep in a straight line, and protects the head. The muscular sensations remain intact, to give the position of the whole body. Touch, taste, smell, and the facial sense are much more influenced by changes in the weather than the sense of sight, so that it is much more difficult for the blind to go about in rain, wind and storm than it

is for the sighted. The wind is especially destructive to the facial sense, and hearing also is much impaired by it.

The physical organism is taxed beyond its strength by the blind, and consequently there is a great loss of vitality. Statisticians have noticed frequently that longevity is considerably diminished in the blind, though they do not often attempt to account for this diminution. In my opinion it is almost altogether due to this strain on the nervous system in locomotion. Every blind man will admit that he suffers more from nervous exhaustion, after a long tramp by himself, than from any other cause. This is a strong reason why the blind should abandon those employments which demand physical exertion of this kind, and turn their attention to those which draw on the mental forces.

The intellectual capacity of any blind person depends jointly upon the age, rank, position and natural ability of the individual. The power to move about without assistance, on the other hand, depends almost entirely upon the age at which the individual becomes blind. The actual degree of blindness is of some importance. A fraction considerably less than 1/200 is often of great assistance in locomotion, but it is so unreliable at times that it is more confusing than helpful. Those who become blind early in life generally attain the greatest proficiency in getting about, but there are so many exceptions to this generality that I feel justified in saying, that if any blind person can be got to think that he is able to go about

without a guide, the old saying, "where there's a will there's a way," cannot be gainsaid. Those who have lost their sight late in life are often so thoroughly convinced that they cannot find their way around that they refuse to try the new methods. The mere perception of light, here again, though of no direct practical value, is of vast importance, inasmuch as it stimulates its possessor to greater effort, because he yet feels himself of the world of the sighted. Those who have been blind from early infancy seldom become able to move about with as much ease and assurance as those who have lost their sight after they have learned to walk. The reason is, that it is so very difficult to teach them what erect carriage and walking in a straight line mean. Patient and careful training, however, enable them to acquire these ideas, and they have been so long accustomed to being without sight that when they have conquered these difficulties they often make the most successful scholars. It is so hard to make them understand the importance of these matters of carriage, dress and general deportment that they fail signally in after life. This is also true of the rest of the blind to some extent, and lies at the root of many failures. The blind must never forget the importance which the sighted attach to these matters; it is fatal to their success both in business and in society.

CHAPTER IV.

THE THEORY OF VISION.

AN analysis of the nature of vision is of some importance to our psychological research, for by it we shall learn what sensations are really irretrievably lost in blindness. To anticipate, these are sensations of colour and its variations into hues, tints, and shades. Distance, size, and magnitude can be to some extent replaced and, moreover, they do not actually arise from external objects, but are inferred from certain colouring, together with muscular activity. The importance of this distinction is rather psychical than practical. The power to obtain ideas of distance, size, etc., nevertheless enables the blind to form mental pictures of the external world which, without such ideas, would be impossible. Colour sensations cannot be replaced, and it is therefore impossible for those born blind to have any idea of painting, photography, beautiful landscapes and gorgeous sunsets. The only appreciation of such things that these people can have is the pleasing sound of the language in which descriptions of the beauties of art and nature are so often clothed. In this brief account of the theory of vision, these remarks must be borne in mind.

It is now more than one hundred and eighty years since Bishop George Berkeley gave to the world the

true theory of vision, and yet there are few, even among educated people, who understand its nature. Nor is this much to be wondered at, since outside of lecture-rooms little interest is taken in such matters. It appears to me that this is one of the philosophical theories which has great practical importance, inasmuch as a correct understanding of it enables a person to comprehend the real meaning of blindness, and consequently make him better fitted to deal with this affliction whenever it arises. It is for this reason chiefly that I have devoted a special chapter to the theory of vision.

"Perhaps," says Professor Bowan, in his work on "Modern Philosophy," "the only fruitful and important truth in psychology which we may fairly claim to have been first discovered in these modern times, and as universally accepted both by physicists and metaphysicians to be now established beyond all doubt or question, is that contained in Bishop Berkeley's 'New Theory of Vision,' first published in 1709, when its author was only twenty-five years old. The germs of it were certainly to be found in the metaphysical speculations of Malbranche, especially in the first book of the 'Search after Truth,' and in a brief paragraph of Lock's 'Essay on Human Understanding.' But these were hints the full meaning and significance of which were not even suspected by those who made them. Consequently their priority of publication no more lessens the merit of Berkeley's grand discovery than the shrewd anticipations of the true theory of gravity by Kepler, Huyghens and Hooke

detract from the glory of Newton in first tracing out that theory to its furthest consequences and verifying it by mathematical proofs in his immortal Principia. When first published Berkeley's doctrine appeared so novel and improbable that it was regarded as a sort of philosophical romance or paradox. But it is now formally taught in elementary treatises in optics, and is adopted into every scientific creed, though few persons take the trouble to put the several portions of it together so as to contemplate its results in the aggregate, or as one whole.

"Yet the doctrine may be summed up in one short statement: Berkeley proved that there is no resemblance whatever between the visible and the tangible qualities of material things, that colours are the only objects of sight, while the distances, figures, and magnitudes of external objects are not seen, but only inferred or estimated from qualities which are really visible. That is from variations of colour and from gradation of tints and of light and shade. Prior to experience, without the aid of the other senses, our eyes could not inform us that anything existed out of ourselves. We do not see the outer world."

In these paragraphs Professor Bowan has indicated both the magnitude and importance of Berkeley's theory. He has put the whole thing in a nut shell, so to speak. Nowhere have I found a clearer and more appreciative and, at the same time, so condensed and concise account of Berkeley's philosophy than in Professor Bowan's work. The temptation is strong to quote more of his exposition of the theory of

vision, but space does not permit. No doubt Campbell Fraser's editions and reviews of Berkeley's works are fuller and more definite, but in sympathy with and comprehension of Berkelianism, Professor Bowan quite equals the distinguished Edinburgh professor.

That the power to move among and arrange objects in an orderly manner in space is acquired, Berkeley proves, by pointing to the fact that men born blind and afterwards made to see, say that the trees, stones and other external objects touch, or rather are in, their eyes. It requires long training before such persons are able to use their sight to much advantage.

It is quite clear that the most we can expect to see of an abject is its length and breadth. Its thickness must be inferred. From experience previously gained the mind knows that a certain variation in tinting and shading is due to differences in surface, and it infers from a particular shading that an object has three dimensions. The stereoscope is a proof of the correctness of this statement. In this instrument two pictures are presented, the one a picture of that part of an object usually seen by the right eye, and the other a corresponding picture of that seen by the left. The sensation produced by these pictures is quite the same as that produced ordinarily, and the mind infers that this sensation arises from a solid object. The line of vision is direct, and vision can no more be deflected from the straight line than a gun can be made to shoot around a corner, although Professor Bowan tells us of an Irishman who claimed to have one so constructed. The stereoscope is a

means of deceiving the judgment, and similar deceptions occur whenever one and the same sensation can be produced by two causes, the one of frequent and the other of infrequent action. Whenever the infrequent cause is operating, the judgment is always misled. Thickness or solidity, then, is inferred, not seen.

It is quite easy to prove that neither is distance seen. If vision cannot be deflected from the straight line, it is obvious that the same impression must be made on the retina, whether this line be long or short. We infer the distance from the distinctness or faintness of colouring, and from the relative position of objects to each other, the distance of some of which are known. Distance is also inferred from the tension of the muscles of the eye required to bring the object upon the most acute point of vision. The nearer the object the more the convergence of the eyes, and *vice versa*, when judgment of the distance of a certain object is frequently made it becomes very accurate. A practised ball-player can judge the distance of a ball in motion with an accuracy surprising to the onlookers. Very great distances, such as those of the fixed stars, we do not even attempt to estimate. That the distance of the headlight of a locomotive approaching amid surrounding darkness cannot be even approximately determined is conclusive proof that, without the presence of familiar objects and colouring, we can form no judgment of distance.

If distance is a matter of inference it is quite clear

that magnitude must be so also, for the visible magnitude of any object depends altogether upon the supposed distance of the object from the observer. The greater the distance the more liable to err is a person in the judgment of magnitude. The field of vision is fixed that there is always the same number of visible points falling within it. The best proof that magnitude is not seen, is that when objects are far above or far below us they appear much smaller than they do when we are on a level with them. If the dimensions of these objects were directly or actually seen it could make no difference from what point they were viewed.

Of course, the fact that distance, size and shape are inferred, and not seen, has no practical importance in the use of sight. Psychologically, however, it means that though these ideas may be got from sight indirectly, they are not altogether destroyed with its loss. A full comprehension of this shows how idle such questions are, How does a blind man manage to find his mouth? How is he able to find his way about? and the like. I have already shown how that the blind possess these ideas. Their significance is this, that by them the blind can obtain ideas of everything in which they are materially involved. For instance, by examining a small portion of the design and form of any object, by the help of memory and imagination the blind can obtain an idea, imperfect, it is true, of the whole structure. The very imperfection of this idea, however, often adds to the beauty of the whole, since

the minor defects are filled in by imagination. Ideas of cathedrals, palaces and other architectural works are, as a matter of fact, obtained by the blind in this way.

The sensations absolutely lost in blindness are, then, colours. Colour varies in intensity, hue and tint. The intensity of light is the force with which any colour impinges upon the retina; for example, the difference between the pitch darkness of midnight and the obscurity of twilight. Hues are the various colours of the spectrum corresponding to the rates of vibrations. Red, green and violet are the primary colours. Tints are shades, corresponding to the degree of purity or saturation of light. Tints are less differences in colours caused by mixtures of complementary colours. Complementary colours are those which unite to form white light; light is the only element of visual sensation proper. There is, however, another class of sensations got through the optic nerve. The visual sensations are aided by muscular sensations which enable the eye to move rapidly, thus multiplying and contrasting the various colour sensations, which are gotten in a given time. These muscular sensations also add a new and different element when a fixed connection between visual sensation of any point of the eye distant from the centre and the muscular sensation involved in bringing the eye so as to bring the image upon the yellow spot, the point of most acute vision, has been established, then muscular sensation becomes a perfect

sign of a certain spacial distance and direction. It is these sensations which form the basis of visual judgment of distance, shape and magnitude. In blindness these judgments must be made by the other senses. They can no longer be obtained through the optic nerve, but it is of vast importance to the whole life of the blind to remember that the power to form them is not altogether lost.

CHAPTER V.

THE HIGHER PSYCHICAL PROCESSES AND STAGES OF KNOWLEDGE.

MY aim here is to make good the assertion made in the first chapter, that blindness tends to intensify and strengthen the higher mental powers. As I did in treating of sensation, I adopt Professor Dewey's views in examining these processes and stages of knowledge, contenting myself with pointing out wherein the blind differ from those in the normal condition, and also with showing where possible the reasons for this difference.

Now, though it is in sensation that the psychical limitation of the blind arises, yet, still this limitation is bound to affect the whole structure of the mind; for, not only does the mind act upon the sensuous material presented to it, but also it is reacted upon by this same material itself. When sensations have been built up into the forms of knowledge these elaborations themselves become new organs for the further acquiring of knowledge. Thus sensations are to the mind what food is to the body—they are received into it, digested by it, and made into organs for its use. Further, just as the body is modified by the lack of certain kinds of food so the mind is altered by the loss of a particular class of sensations, and the more important the food and sensations lost, the

greater will the modification and alteration be. Normally by far the more important of our sensations arise through affections of the optic nerve, and the more interesting stages of our knowledge are developed out of such sensations. Consequently the alteration produced in the structure of the mind by the withdrawal of these optical affections is bound to be very extensive. I endeavour to show that this alteration is the condition which renders a more intense mental life possible for the blind.

THE PROCESSES OF KNOWLEDGE.—The world, as we know it, is not a mere passing assemblage of sensations of colour, heat, cold, etc., but a complex psychical product. This psychical product is the result of the action of the mind by means of its organized structure upon the sensuous material presented to it. The knowing self, on the other hand, is the result of the reaction of the apperceived content upon the mind's organized structure. The one process is called apperception; the other, retention.

APPERCEPTION.—Apperception combines the various sensuous elements presented to the mind at once into a whole, and unites these successive wholes into a continuous mental or intelligent life. It is divided upon the basis of the relative simplicity of the processes, and the relative activity of the mind in forming them into three stages—association, dissociation and attention.

ASSOCIATION.—The mind never leaves sensuous elements isolated, but connects them into larger wholes. Association may be either simultaneous or

successive. In simultaneous association all the elements present at one time are fused into one whole. This fusion may be either a summation of various minute stimuli arising in one sense; *e.g.*, composite character of colour, or a combination of sensations from different senses; optical sensation is the fusion of colour sensation, muscular sensation and local sign.

SUCCESSIVE ASSOCIATION.—Whenever any associating activity recurs, all elements which have been previously involved in it recur also. Successive or connective association is, therefore, based on the fusion of simultaneous association. Both identity and difference are necessary to it, for without some point of identity between the present and the past there would be no succession, because no continuity; and without an element of difference there would be no succession, because no change. An associative activity has some elements the same as those of a previous activity and some different. The different element will be called up with the like, but from its difference gets an independent existence. This associating activity is called representation or redintegration, and rests on identity, either external (redintegration by contiguity) or internal (association by similarity). In the one case the connection is extrinsic, in the other it is intrinsic.

ASSOCIATION BY CONTIGUITY.—There are two forms of this activity, spacial and temporal. The spacial covers all cases where one element recalls some other which has been coexistent with it in space. It is easily cultivated because of the fact that the larger number of our ideas are gained through sight. Words

denoting spiritual and ideal processes were originally words which signified material things existing in space, to comprehend—literally, to grasp together. Temporal contiguity establishes fixed orders of connection, as in the alphabet, A calls up B, and B, C. It is in forming the proper order, therefore, that the cultivation of this activity consists. Speech and music depend for their existence upon the arrangements of regular associations in time. The majority of our associations involve both spacial and temporal contiguity, together with simultaneous fusion.

In blindness the power to form associations by spacial contiguity is almost destroyed. No doubt, so far as the sensuous material necessary for this function can be obtained through the remaining senses, it is still active, but its extensive use is effectually stopped, because the objects which occasion this activity under normal conditions occupy such an extended area. The mind, in the arranging of its knowledge, is consequently forced to employ its other modes of association. Among these other modes, perhaps that of temporal contiguity is most extensively cultivated. It is this enforced cultivation of association by temporal contiguity which enables the blind to succeed so often and so well in music and oratory. In the learning and executing of musical selections the blind rely on this activity almost entirely, and in ordinary literary studies it is far more extensively used by them than it is normally.

ASSOCIATION BY SIMILARITY.—In associating activities, an element may occur frequently. This element gains in redintegrating power at the expense of those

occurring less frequently, and finally acquires the power of acting independently, so as itself to redintegrate ideas. The extent to which any individual employs this form of association forms a good basis for determining his intellectual character. He who employs association by contiguity is continually weighed down by a vast mass of contiguous matter; while he who uses association by similarity pierces through the mere externally contiguous objects, and finds in them fundamental resemblances, thereby freeing the mind from all irrevelant detail got through mere contiguity. Professor Dewey illustrates the difference in intellectual development, depending on the use of the one or the other of these forms of association by contrasting the view of an apple taken by a peasant and that taken of one by Sir Isaac Newton. The peasant, employing mere spacial contiguity, reads into the apple that it is good to eat; while to Newton, employing association by similarity, it exemplifies the laws of all falling bodies. The connection formed by contiguity is accidental. It burdens the mind and uses up its power. Things and events which have little real relation are often strung together by this activity, and persistence in using it is fatal to the acquiring of knowledge on a large scale. Connection by similarity, on the other hand, is internal. It adds to the mind and increases its carrying power. There are two classes of associators by similarity: the artistic, who use the bond of resemblance between ideas—such people have a keen intuitive power: the scientific, who are slower, and trace every step in the connection. There are

three forms of this activity: association by resemblance, by contrast and by assimilation. As the blind employ these forms exactly as the sighted do, they need no special examination here.

As we have seen that the more common form of contiguous association is lost in blindness, it is hardly necessary to point out that association by similarity is more extensively used in consequence. The extensive use of this latter form has been shown to result in a higher intellectual development. It follows from this that the blind should have great intellectual development. This is, moreover, a necessary result of the withdrawal of association by spacial contiguity, because the mind is thereby compelled to employ its remaining powers in associating activities. The only other condition necessary to this result is not always present in the blind—that is, sensuous material enough out of which to construct intellectual edifices. It is the lack of this material which prevents the majority of the blind from attaining to that degree of intellectual development which is otherwise necessarily involved in their condition. It would be wise economy, then, to put these data within their reach, and this may be done by improving the facilities for their education and increasing the number of embossed books largely.

Dissociation.—In associating sensuous elements, the mind never gives all the elements equal value, but emphasizes some and neglects others. Dissociation is therefore an aspect of association, because only those elements can be dissociated which have been

originally associated—analysis presupposes synthesis. It is a more active form, however, for in it the mind selects some elements and neglects others, while in association all the elements are noticed. Dissociation is involved in association, because in any associating activity some one element always stands out as the bearer of the others. The function of dissociation in psychical life is to break up the mechanism in which, if left to itself, association would result. It also sets the mind free to act for ends of its own.

ATTENTION.—Attention is that activity of the self which connects all elements presented to it into one whole with reference to their ideal significance; that is with reference to the relation which they bear to some intellectual end. Ultimately this end is the self, and the whole process is one of self-development. There are three aspects of attention—the selecting, the adjusting, and the relating activities. The mind selects some of its activities while it neglects others; thus considered, attention is a higher form of dissociation, but in dissociation the stress is laid because of the interest of the presentation for the mind. In attention, because of the interest of the mind in the presentation. As adjusting activity of attention enables the mind to respond quickly to its presentations, and the extent to which the mind is able to anticipate what is coming depends the rapidity of the presentation's recognition and interpretation. Attention is a relating activity, and consists of finding relations of identity and difference. As there is no knowledge without relation, so there is none without attention.

The mind's activities are not in themselves altered in blindness, but the ends towards which they are directed are generally of a different character. For example, a blind man is not apt to find himself realized in the acquiring of such accomplishments as a particular stroke in billiards or a certain pose in cricket. Of course, I do not claim that every person possesses these or similar ambitions, or that every blind person is free from them, but merely that as most of such ambitions depend on sight for their realization, the blind are of necessity less exposed to them. It follows also of necessity that mental gymnastics, if I may be permitted the expression, are more likely to be indulged in by the blind, with a consequent strengthening of the mind. This difference in the ends of attention, stated briefly, is that the blind do not make ends for themselves of external appearances of themselves, but seek to shine in the internal world of the mind.

RETENTION. — Retention is bound up with the apperceiving activities. Apperception gives character to the material apprehended, retention gives character to the self. Apperception and retention are mutually involved in each other. Retention reserves for future apperception what apperception has given to it in past experience. Retention is growth of the self in fact. Just as the physical organism receives and digests its food, so retention assimilates the results of apperception into the organized structure of the mind.

THE STAGES OF KNOWLEDGE.—The stages of knowledge are the forms into which the mind's activities

put all the sensuous material presented to it. The growth of knowledge is a process of self-development. It advances from the external and least representative to the internal and most symbolic. Added symbolism gives added meaning. It is a process of idealization from the less to the more significant, and the stages in this process are perception, memory, imagination, thinking and intuition. As far as the forms of these stages are concerned, in blindness they remain unaltered, but the loss of so much of the sensuous material of knowledge necessarily effects a change in their content. It is not required, therefore, to give an account of the forms of the stages, but simply to indicate the difference in content, and a short paragraph will dispose of each stage.

PERCEPTION.—Perception may be defined as knowledge of actually present particular things or events. As sight ordinarily furnishes the greater part of the data necessary to this knowledge, it follows that perception is narrowed in the blind in area by more than one-half. It is all that intense interest in the variations of facial expression, of dress and general appearance of relatives and friends, all that enjoyment derived from the observation of the moving life of the streets, of the shops, of the homes; in fact, all that pleasure and excitement connected with the visible details of life which is lost in blindness.

MEMORY.—Memory may be defined as knowledge of particular things or events once present, but now no longer so. It is generally believed that the blind have an especially retentive memory. Broadly speaking, this belief is well founded. It is a fact that the

blind employ knowledge in this form more than is generally the case; but as memory refers back to perception, it is obvious that the memory of the blind is subject to the limited nature of their perception, and that though the images of objects may be retained more vividly by them, the number of these images is limited to just the same extent as were the original perceptions of the objects. The greater vividness of the remembered image is not an element in memory at all, so that it is better to say that the process of retention is more developed, for the memory itself is actually less perfect.

IMAGINATION.—Imagination is that operation of the intellect which embodies an idea or image in a particular form. In imagination the blind are very fertile, and as literature is largely the work of imagination, the blind are well fitted for its pursuit. A blind man's imagination produced that greatest of all English epics, "Paradise Lost." Imagination must supply all that perception fails to give, and it is for this reason that the blind cultivate it. The faces of friends, when no longer seen, must be imagined, and if they have never been seen they are altogether the work of creative imagination.

THINKING.—Thinking may be defined as knowledge of universal elements: that is, of ideas as such or of relations. From its definition it is evident that blindness does not effect it. There is a considerable difference in the subject matter of thinking or thought, but there is none in its form, thinking.

The stages of knowledge are all mutually implicated, and are all manifestations of the general law

that knowledge is a process of recognition of the individual, through the functions of analysis and synthesis. While every concrete act of knowledge is self-related, and therefore one of intuition, the term is limited by Professor Dewey to ultimate wholes of knowledge, and these he calls, intuition of the world, intuition of self, intuition of God. The first two are dependent upon each other, and both together are dependent upon the third.

Intuition of the World.—The wholeness of the world, the recognition of nature as a system is implied even in the simplest perception. It is the result of a synthesis by the mind of several intuitions, which form a chain from the conception of substance to the intuition of the world. Each link in the chain represents the recognition by the mind of a new element in its presentations.

Intuition of the Self.—This is the knowledge of self as a universal, permanent activity. This knowledge has been already implied, for the recognition of self is only the perception of what is involved in every act of knowledge. It is a more complete stage of intuition, for in it we recognize that the true existence of nature is in its relation to mind.

Intuition of God.—This is the complete stage of intuition. The true self-related must be the organic unity of the self and the world, of the ideal and the real, and this is what we know as God. Every concrete act of knowledge involves an intuition of God. It is the most concrete and developed form of knowledge, and at the same time is involved in all knowing

CHAPTER VI.

RELIGION OF THE BLIND.

HITHERTO in examining the psychical life of the blind we have studied its cognitive aspect chiefly, and have noticed the emotional and volitional aspects only incidentally. I am not prepared to carry the investigation further within the limits of this work. I cannot, however, close it without making a few remarks upon the religion of the blind.

Religion belongs to the emotional aspect of mind. As intuition of God is complete intuition, so religion is complete feeling. Will is the concrete unity of knowledge and feeling. Will is the source both of ideals and of the realization of them. Each individual's will depends for its particular nature upon his education, surroundings, etc. Religious will is the highest form of will, hence any individual's will determines his particular religion. As the blind vary in their ideals the question of their religion cannot be approached from this aspect of the mind's modes of activities. We must return then to religion as complete feeling, try to find out what it depends on normally for its full realization, and discover what alterations blindness brings about.

In treating this subject I no longer follow Professor

Dewey's psychological exposition, which, though excellent, is much too lengthy for my purpose. The elements of my view are Hegelian, and may be found in the account of Hegel's absolute spirit at the close of Schwegler's brief, though wonderfully comprehensive, "History of Philosophy."

"The burden of all religion," says Schwegler, in setting forth Hegel's view of it, "is the inward exaltation of the soul to the absolute as the all-comprehending, all-reconciling substance of existence, the knowing of himself on the part of the subject as in unity with God. All religions seek unity of the divine and human."

The religion which most fully realizes this description, in that it unites the divine and human in one personality, is Christianity. Art is the transition to religion, and through it souls are often led to religion. The more highly idealized and completely realized any religion becomes, the more strongly it influences art and the more indissolubly it becomes bound up with art. Christianity of to-day, therefore, is a complex of art and religion. So far as the pure religion of this complex product is concerned it is affected in no way with regard to the ability to appreciate it in blindness; but when the part which art plays in bringing men into religion is considered, then, so far as art cannot be felt by the blind, just so much less able are they to enter into the spirit and truth of Christianity. The feeling of religion is a process of growth which in its beginning depends on art. As a broken stairway renders ascent difficult to so many

and impossible to some, so interrupted art makes religion hard for many to reach and for some closes it altogether. Our effort here, then, must be to find out what steps in art are destroyed in blindness, and how far religion is closed in consequence. We shall find that these shattered steps are at the foot of the approach, and that to many these alone are sufficient for them to reach religion. Architecture, sculpture, painting, music and poetry are the forms of art aiding in the religious life of the Church. These arts are really more than aids to Christianity; they are virtually parts of it, and of them the first three are to the blind as though they were not, almost.

ARCHITECTURE.—The beginning of art is architecture. It belongs to the symbolical form of art, because in it the matter is greatly in excess of the form. The finest architecture in any country is that shown in its buildings devoted to its religion—the Temple of Solomon at Jerusalem, Santa Sophia at Constantinople, St. Peter's at Rome, Notre Dame at Paris, and St. Paul's and Westminster Abbey at London. One may go farther, and say that the finest buildings in almost every community are its places of worship. This is evidence enough that architecture is part of religion. It is equally easy to show that the blind have no appreciation of it. Although a fair idea may be formed by the blind of the dimensions and general outline of a structure through slight tactual perception and a full description, yet that feeling which all travellers know and which comes to them when a glorious piece of architecture bursts upon their

view for the first time, is unknown to the blind. No remembered image, no imaginary creation can be anything like this feeling. The chief value of these architectural aids to religion is the power which they have of clustering associations about them. The sight of the old, familiar church makes one feel more religious than hundreds of thoughts about it do.

Sculpture.—After architecture comes sculpture. In it art is still in subjection to a stiff, unyielding material, yet there is not a vestige of the matter which is not made the vehicle of the idea. From the religious life of the Protestant Church works of the sculptor's art have been almost banished. So beautiful are these creations that they attract worship to themselves and do not permit religious feeling to go beyond them. The religions of ancient Greece and Rome were based upon image-worship; that is, so far as the outward expression of it is concerned. The works of the Greek masters have never been surpassed. The Church of Rome has always employed the works of this art in her aid. The statues of Our Lady of Lourdes and that of Our Lady of Rocchimadora were among the most famous of these statues. Sculpture is also beyond the blind, because its creations can be no more appreciated through tactual perception and description than those of architecture.

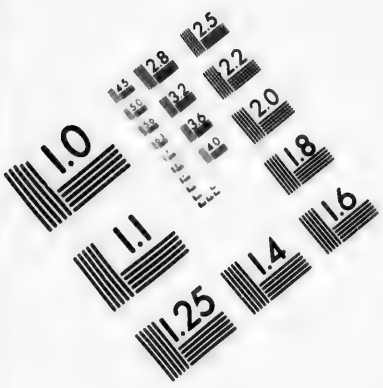
Painting.—In painting, art is at least freed from its bondage to unyielding matter, and one dimension of space disappears from it. Its material is a coloured plain. The greatest works of this art have been representations of religious feeling. Raphael's

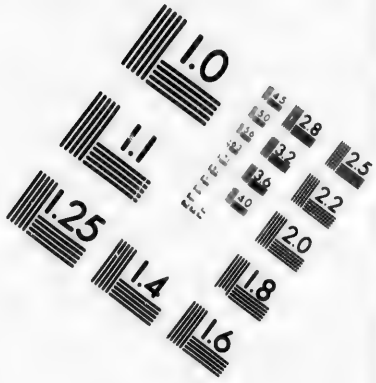
"Madonna" and his "Transfiguration," and Angelo's great picture in the Sistine Chapel are among the grandest paintings of the world. It has never been seriously pretended that the blind have any appreciation of painting, though if some people are right in holding that the blind can discriminate colours, it is just possible that some day a blind man may be made a judge of pictures to hang in the National Gallery.

Music.—The perfect sublimation of space is music. Its material is tone, the inner trembling of a sonorous body. Handel's "Messiah" is one of the finest of the myriads of songs in the service of religion, and religious music is the finest of all. Music plays an important part in almost all religious exercises, and is perhaps the most potent of all these artistic aids to religion. Its connection with religion is too intimate to need further comment, and its appreciation by the blind is proverbial.

Poetry.—Poetry or the literary art has for its material, not sounds as such, but sounds as the signs of ideas. All the other arts return in poetry. Its finest creations are religious. The work in Isaiah and Job was done thousands of years ago, and yet it has never been surpassed and rarely equalled. The whole of religion is poetical—the rhythmic relation of man to God. The appreciation of verse is keen in the blind. In the Ontario Institution for the Blind the books most read in my time were the works of the great poets.

In this analysis the limitation of the blind in the appreciation of art, as involved in religion, does not





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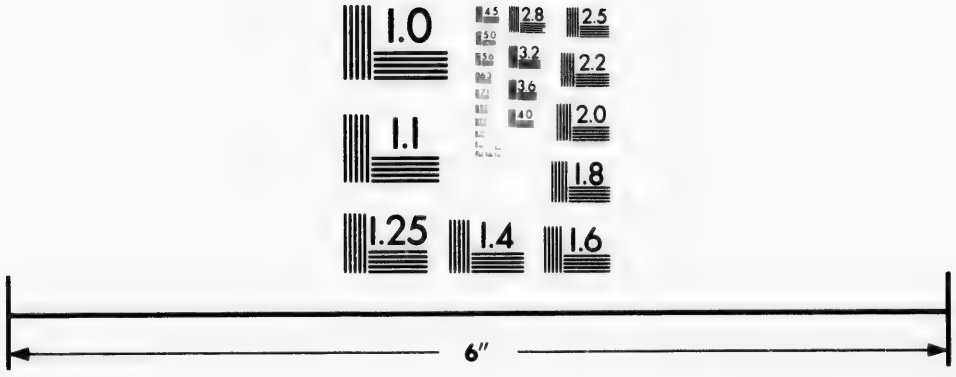

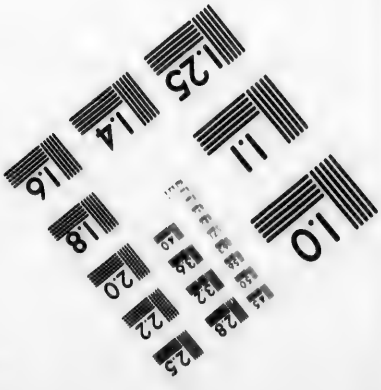

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appear so great as when we look at it as a whole. The religious life of the Church, in spite of the strenuous efforts of her ministry to make it otherwise, depends largely on the attractions it has for the eye. The ritual of the Church charms by virtue of its artistic arrangement. The music of it is grand in itself, but the watching of the changing facial expression of the singers adds greatly to its charm. The decoration, painting and trimming of the church itself are agreeable to look upon, and the passion to see and be seen is gratified in the church social life. All this combines to make Christianity attractive, and is helpful to religion as long as these aids do not become ends in themselves. The opinion of many that this is already of too frequent occurrence explains the existence of so many sects, who think that the whole of the visibly artistic should be banished from the church, along with statuary. With the social and artistic life of the Church, the blind have little in common. They take no interest in gorgeous pageants, and, moreover, as their affliction prevents them from following the varying attitudes of the service, their non-conforming to these attitudes attracts attention, and often provokes remarks, so that in time church becomes positively distasteful to them, but religion does not.

After what has been said it is hardly necessary for me to meet the charge of materialism sometimes brought against the blind. The blind have too active a mind and too definite an idea of matter to confuse

matter and motion with the origin of all things. The blind are often indifferentists to religion, sometimes agnostics, but very seldom materialists. Those blind persons of my acquaintance who might be called materialists, using that term in its widest significance, are those who have become blind late in life, and whose mental centre of gravity has been disturbed by the suddenness of their misfortune. It is hard for such persons to understand how a God could be and they be treated so. The majority of the blind submit quietly and cheerfully to the inevitable. I have been told by many that they have never known a habitually discontented blind person. I believe that I know one, and only one, yet even he is not a materialist.

PART II.

EDUCATION OF THE BLIND.

CHAPTER VII.

GENERAL VIEW OF THE SUBJECT.

FOR the last hundred years well-disposed governments and philanthropists have been most active in providing for the education of the blind. Since the establishment of the "Institution Nationale des Jeunnes Aveugles," in 1784, through the efforts of Valentin Haüy, there is not a decade unmarked by the opening or erection of some new educational institution for the blind. In fact, even before education came to be regarded as part of a nation's wealth the blind were furnished with special schools. The blind themselves, however, have benefited little by all this well-meant kindness; and it was not until it came to be generally recognized that the blind were the persons best able to say what their own needs were, that real progress began to be made. It is only in those countries where this fact is realized that the blind, as a class, are successful. It is only where they have at least a share in the management of an institution that much success is achieved.

The blind know their own wants far better than the sighted possibly can, and they are, therefore, the only persons in a position to deal with these wants. The history of the movement to educate the blind consists almost altogether of facts which prove what I say. It was not until after the inventor's death that the Braille system was officially recognized at the Paris school. The Braille system, at the time of its invention was, and, by many, is still thought to be the best form of tangible print. It was years before this system came into general use, and even now there are some schools which refuse to employ it. It is strange how determined the sighted superintendents were to stick to the old systems. The "British and Foreign Blind Association," after a lengthy and careful consideration of the various systems of embossed letters, decided in favor of the Braille; in direct contradiction to this opinion (the only one ever given by any association of the blind) the sum of £20,000 was expended in America for the purpose of embossing books in the Roman letter, the kind of print which the British and Foreign Blind Association had declared to be the worst. It is now pretty generally agreed that some form of point character is best suited to the wants of the blind, although some schools still teach and employ the Roman letter. When the "American Printing House" abandoned this letter the last great stronghold was won for the point systems.

The blind themselves have brought about this change and, I believe, that it is they who must solve

for themselves their own problems yet to be solved. This idea must be kept in mind throughout this work. The blind, I contend, are the only persons who understand their own difficulties well enough to overcome them. Those who have done most to improve the condition of the blind have themselves been blind. Braille, Montal, Dr. Armitage, F. C. Campbell, W. B. Wait, and H. L. Hall were men whose blindness enabled them to deal with our difficulties. It is true that, according to Dr. Minor's definition, the late Dr. Armitage cannot be said to have been blind; but his vision, so he tell us, was impaired to an extent which made it possible for him to realize the position of the blind. These are by no means all the men who have done much to further the interests of their afflicted brethren. There are many more, but these few illustrate each a different work. Braille invented and taught his unsurpassed system, Montal proved that piano tuning was the best trade for the blind, Campbell and Armitage founded and built up the Royal Normal College and assisted greatly in the work of the "British and Foreign," Mr. Wait promoted the New York system and trained his pupils as agents and small traders, and Mr. Hall is the founder and manager of "The Blind Men's Working Home."

Though many sighted persons have contributed much to the bettering of the condition of the blind, yet where the greatest amount of success has been attained, the blind have been at the helm. Thousands of dollars have been spent by the sighted in attempt-

ing to introduce the Roman letter, and now, in the most advanced institutions, these embossed books are preserved in their libraries only as interesting relics of bygone times—"literary curiosities," as Armitage calls them. He says, also, that the extent to which the Roman letter is used in any school forms a good basis for determining its usefulness: "The less this extent the greater its usefulness, and *vice versa*." As with the Roman letter so with every other scheme, whenever the advice of the blind has either not been asked for, or disregarded, a useless waste of time and money has invariably taken place.

Had it not been for recent inventions I could not have done better than to refer the reader to Armitage's work, on "The Education and Employment of the Blind," for the correct view of their education. Indeed, in many respects, this work is of great value even now, but the stereotype-maker and stereograph have changed the situation altogether, and former means of embossing have only an historic interest. A full description of these machines will be found in the next chapter, but yet I must point out here how completely they have revolutionized the methods of educating the blind.

Hitherto the expense of embossing books has prevented the blind from obtaining the most improved text-books. In fact, so great was the cost of stereotyping raised letters that in many subjects there existed no technical works at all, and even when there were any the subjects were often dealt with in so antiquated a fashion that little benefit could

be derived from them. Especially is this the case in the physical and natural sciences, where the terminology and nomenclature were so long unsettled. In former times few books could be produced, so that great care and consideration had to be given to their selection. Many works were also published in a contracted, or rather extracted, form. In some of these extract books it would be difficult to discover the original work. The change which these new inventions have brought about is chiefly one of cost. The stereotype-maker, itself an inexpensive machine and cheaply operated, reduces the cost of stereotyping embossed books by 90 per cent. An illustration will bring out more forcibly the meaning of this reduction. Prior to the invention of the stereograph the Bible was stereotyped in New York Point by the American Printing House, Louisville, at a cost of $3,000. In his last report, Dr. John T. Sibley, Superintendent of the "Missouri School for the Blind," says that by his stereotype-maker he could make the plates for this work in American Braille for $500, and at this figure he would have for himself a handsome profit. The American Printing House is altogether supported by the American Congress, so that $3,000 is the actual cost of stereotyping this work.

Besides giving to the blind a great variety of text-books, these machines also make it possible for a large amount of general literature to be placed in their hands. The actual cost of stereotyping by this means is less than that of stereotyping for the ordinary ink-printed books, but the paper used is, of course, more expensive

in consequence of the amount needed for embossed books. Considering, however, the liberal way in which the State assists in these matters, there is practically no limit to the number of books which may be made available for the blind. As far as text-books are concerned, there is no longer any reason why they should not receive the same education as is given to the sighted. Are there other reasons which make it necessary to give them a special training? This question really means, do the blind need special schools? There is considerable difference of opinion upon this question, both among the blind and among the sighted. The only class of persons who are fairly unanimous upon it are those officially connected with such schools, whose opinion is, of course, favourable to them. I would not do these people the injustice to say that personal feelings may influence their judgment; but I do say that though their opinion is of weight so far as the advantages of special schools are concerned, yet they are not in a position to judge of the usefulness of training the blind in the ordinary schools. The blind themselves have not, so far as I know, pronounced upon this question, and until they do it must remain in abeyance. I can only point out the data necessary to the solution of this problem, and much of the data is at present wanting.

First of all an extensive organization must be formed, consisting of the intelligent blind in all parts of the world. Then a careful inquiry must be made into the after success of the blind trained in the

special schools, and of those trained in the ordinary schools, and the amount of success in the one class, compared with that attained by the other. Upon the result of this inquiry an opinion might be safely based. The organization would not be very difficult to obtain. A federation of existing associations would almost answer the description just given. This question could be solved by precisely the same methods as those adopted by the British and Foreign Blind Association, in determining the best form of tangible print. My own opinion is that circumstances ought to govern each individual case. If circumstances permit, it is better for a child to remain at home and attend the day or public schools than to go to a special institution. The chief advantages of so doing are, I consider, the preserving of the home ties and the avoiding of those faults of carriage and of character necessarily inherent in the life of a special school. The chief danger in special schools is, as Dr. Armitage says, that those officially connected with them are apt to forget that these schools exist for the benefit of the blind, and not as comfortable sinecures for themselves. This is peculiarly apt to occur in institutions altogether in the hands of the State. The plan of the London Board School, of bringing the blind to different local centres, is found to answer very well, and might succeed in our cities. The best form of boarding-school would be obtained by a judicious combination of educating a number of sighted pupils with the blind. This is the plan of the "College for the Blind Sons of Gentlemen," at

Worcester, and the results have been very gratifying. The sighted pupils prevent the development of those peculiar eccentricities which are generally found in the blind of the special schools, and the blind pupils secure all the advantages of mutual assistance and counsel. As I have said in another connection, I repeat here, that the nearer the thoughts and actions of the blind resemble those of the sighted the more they will be treated as ordinary people. I would advise the parents of blind children to treat them as other children are treated; educate them as they would have been educated had not blindness intervened; send them out to look after themselves just as they would have been sent out under ordinary circumstances. The men who have resolved that their blindness should not interfere with their career have generally succeeded. It is when the blind are coddled that failure is most frequent. Just here arises another grave objection to the majority of the special schools in America. While in these institutions the blind contribute nothing to their own support, and they are allowed to remain for years; neither do their friends pay anything for their maintenance. The feeling of responsibility in this particular is consequently altogether destroyed, a feeling which is kept constantly in the minds of the sighted children. It must be remembered that the majority of the blind come from a class who are taught to look to themselves for their own support at a very early age, so that the destruction of this idea is very unfortunate. When a child from this class is sent to one of these

special schools, the parents feel that they are relieved of a burden and of all responsibility. They do not, when he returns for the long vacation, urge upon him the necessity of doing something for himself, as they do their other children. They rather urge him to remain as long as he can in the place where he has so little to do, and is so well taken care of. When he returns to the school he is encouraged to stay because the Government makes a *per capita* grant, and the officials wish to have as large a grant as possible. I would not go so far as to say that any personal motives operate in the minds of these officials who want this large grant, but I believe that in doing it they do not consult the best interests of the pupils. The pupils then have to depend upon their own initiative alone in order to tear themselves away from the special schools and strike out for themselves. Both at home and in the institution they are advised to keep on attending until they have lost all desire to leave, and almost forgotten that at some time they will have to shift for themselves.

The usefulness of a special school depends almost altogether upon its management. A badly-managed school often ruins a bright pupil, while a well-managed one sometimes makes a successful man out of a dull boy. Whether a school is well managed or not, can only be determined by the amount of success which attends the work of its graduates. I find nowhere in the reports of the American institutions any reference to this matter. It is true that some of them mention that their recent graduates are doing well. I have

found in my experience, strange as it may seem, that a recent graduate is likely to be doing better than an older one. He is full of enthusiasm, and has not yet learned that he toils in vain. Of course, this applies to workmen only, and the defect may lie in the trade itself, and not in the education of the workmen. But their education ought to enable them to turn their energies into other channels. Perhaps it does, but the reports are silent upon this question. Reports are so very vague and unsatisfactory at best, and a careful inquiry ought to be made into this matter by the blind themselves.

The blind are too often altogether unable to follow the plan of education which I have suggested, because blindness is most frequent among the poor. It is this fact which gives to special schools their great value. Though I hold that blindness ought to interfere as little as possible with the course of events which would in all probability have taken place had it not befallen, yet this can only apply to those who give to their offspring certain opportunities, and not to that class who, of necessity, look upon their children as burdens to be got rid of as soon as possible. Normally the children of the poor are comparatively able to take care of themselves, but blind children of this class are shut out from those trades which most poor children enter. I do not consider that the State performs a charitable work in educating blind children. It is true economy to give them a chance to become useful citizens, and this can only be done by giving to them the best education that the land affords. It

is obviously the duty of the State to provide the funds for this education. The manner of doing this has generally been to maintain the blind in special schools. The State, then, must inspect these schools, and if it has an education department, such schools ought to be under the supervision of the head of that department, and conform to the regulations of that department. Since special schools cannot be dispensed with they ought to be closely watched, and the blind themselves ought to have a share in their management.

As to the end, with reference to which the blind should be educated, a few remarks are necessary. The great difficultly is to educate the blind children, who are mostly of poor parents; and, at the same time, not to destroy their sense of responsibility for their own maintenance. Hitherto most of the special schools have aimed only at giving an elementary education to their pupils. There are some schools which do more than this, and it is the pupils of such schools who achieve the greatest amount of success in after life. The Paris Institution and the "Royal Normal College" turn out a higher percentage of successful graduates than other special schools for the blind. These schools not only teach music and piano-tuning, but also give a liberal education to their pupils. It may be said that the great success of these schools is due to the profession of music, and not their educational system. No doubt there is some truth in this, but not only is a good education essential to a

successful musician, but even in those cases where the graduate does not follow the vocation taught him in the school, he generally succeeds in maintaining himself at other pursuits; this can be said of few other schools. Holding, as I do, that the true sphere of the blind is in the arts and professions, and those vocations which depend for their profitable pursuit upon the brain, and not upon the hand, I find in these facts about the Paris school and "Royal Normal College," strong evidence in favour of my view. These two schools, which beyond all doubt lead the other special schools in almost every particular, pay no attention whatever to the ordinary trades taught in the workshops. Music and piano-tuning are the pursuits taught, and as I contend that musical ability is acquired, the success of the blind in the profession of music is due to their intensified powers of concentration and application. It only remains, then, for the blind to be trained as well and as conscientiously in the professions and other mental occupations as they are in music, and the results will be equally gratifying. The blind ought, therefore, to receive an education which will fit them to enter such vocations. The expense would not exceed, if equal, that incurred in training an organist or pianist. When that prejudice, which centuries of contempt for physical defect has created, is overcome, the return would, I believe, be worth the outlay. It took years for the blind to conquer this prejudice which existed against their working at music and tuning, and it may take longer

to remove that against their entering the learned professions; but, as the whole secret of success in scholarship and learning lies in concentration and application, the possession of these powers in a highly developed degree is bound to insure their ultimate triumph. It is not by chance that so many blind men have distinguished themselves, but through the increased activity of their minds. Give to the blind such an education and they themselves will do the rest.

Do I propose then, it may be asked, to give the children of the poor a chance to enter the professions? Surely this is contrary to your statement that blindness ought to interfere as little as possible with the probable course of events had not blindness intervened? Not at all. The existence of special schools alter the circumstances altogether. The home ties are already severed, and in the special schools it should make no difference whether a child's parents are rich or poor. The argument that to do as I suggest would be to educate a child beyond his station, hardly admits of statement, since the education given is paid for by the State, and in the State everybody is supposed to be free and quite as good as everybody else, as has been established by law. Of course I do not contend that every blind man is a born thinker, but only that their peculiar situation renders it more likely than not that they will succeed in vocations requiring thought, and that it would be wise economy to give the blind a chance, since now they are practically given none, notwithstanding the magnificent

sums spent on them annually. It becomes my business to explain in detail how this may be done without any increased cost to the State. If, after a fair trial, my idea is found impracticable then the institutions for the blind had better be turned into asylums, as it would be cheaper for the State to keep the blind in such places than to turn them out to become burdens to the community. The blind themselves, however, would not submit to any such treatment, so that this idea merits no further consideration. Let us pass to my explanation, which will occupy the whole of the rest of this part.

CHAPTER VIII.

HISTORICAL SKETCH OF TANGIBLE PRINT.

THE history of tangible print really begins with Haüy's happy idea of printing in relief on paper. It is true that previous to Haüy's time many efforts had been made to enable the blind to read. One of the most interesting of these early methods is that of the knotted string of Peru. In this system various sets of knots stood for the different letters, and by passing the string through the fingers the blind were able to read the words and sentences thus concatenated. All such methods, however, have only that interest which attaches to precursors of grand discoveries. It was not until Valentin Haüy conceived and executed the idea of printing in relief on paper that the first great step towards the amelioration of the condition of the blind was taken. Since Haüy's time many and various have been the attempts to discover and produce the best form of tangible print, and it is the history of these attempts that I now proceed to sketch.

There are three distinct groups of tangible print, and each group owes its origin to a distinct idea. These groups are, first, the embossed Roman letter, or slight modifications of it; second, those composed of lines; and third, those composed of dots. In the first

group the dominant idea is a determination to adhere to the form of the Roman letter, because, as it had been found to be so useful to the sighted, it was thought that it must be equally useful to the blind. Those who invented the second group saw clearly that to adhere to the form of the Roman letter was impracticable, but they were unable to abandon it completely. While abandoning the shape of the letters they retained the lines of which those letters are composed. The invention of the third group broke away from the Roman letter altogether, and chose to represent the different letters of the alphabet by arbitrary arrangements of well-defined dots. But so persistently have the sighted clung to the idea of the first group that several attempts have been made to retain the form of the Roman letter in this third group, by adopting successions of fine dots to indicate this form. In all three groups, then, we have this dominant idea of the first group. In the second, these lines are retained while the form is abandoned, and in the third the form seeks to be retained though the lines are abandoned. In the best kinds of tangible print both the forms and the lines of the Roman letters are rejected. I take up these groups in the order named.

THE ROMAN LETTER EMBOSSED.—The ways in which the Roman letter has been modified to make it suitable for the blind are very numerous. It is both interesting and instructive to review the details of this movement to establish the embossed Roman letter. Here each effort can only be dealt with

briefly. A full and entertaining account of the details may be found in the late Dr. Armitage's work.

HAÜY'S TYPE.—In 1784, M. Valentin Haüy began to emboss the first books ever printed in raised letters on paper. He chose for this purpose the italic, or written form, of the Roman letter. This form was used in Paris for many years, but it has long since been superseded by other and more suitable forms. It was also introduced into England in 1834, by Sir C. Lowther; but it never met with much success, and was soon abandoned.

GALL'S TYPE.—Gall, a printer and publisher of Edinburgh, became very much concerned that the Bible was not in the hands of the blind, and determined that at least a portion of it should be made available for them. Accordingly, in 1834, he published St. John's Gospel in a modified form of the printed Roman letter. He employed serrated lines, substituted angles for the curves. In 1838, Gall printed for the British and Foreign Bible Society St. Luke's Gospel and the Acts of the Apostles. Gall had to contend with the indifference of the managers of the special schools, and indifference is very much harder to make headway against than active opposition. He was the pioneer of this movement in Great Britain, and through his continued efforts interest was at length awakened, and reading by touch came to be recognized as an essential part of the education of the blind.

ALSTON'S TYPE.—In 1832, the Scottish Society of Arts offered a gold medal for the best kind of em-

bossed alphabet for the blind. The award was not made until 1837. Sixteen arbitrary alphabets had been sent in, all of which were rejected, and the prize was awarded to a Dr. Fry, of London, who had suggested the use of Roman capitals, which had been introduced in America in 1834. John Alston, treasurer of the Glasgow Blind Asylum, set up a printing press and embossed, in 1837, St. Mark's Gospel in the same type in which, unknown to him, it had been printed in 1834 by Friedlander, in Philadelphia. Alston completed the publication of the whole Bible in 1840, and to him, therefore, belongs the honour of having printed the first complete Bible for the blind in any language, because, though Dr. Howe, of Boston, began the work earlier, he did not finish it until 1842. Alston, being encouraged by the decision of the Scottish Society, which he himself helped to influence, made a fatal error in adopting Roman capitals. The blind themselves were the first to rebel. The want of sufficient legibility was the chief objection, and outweighed every other consideration.

HOWE'S TYPE.—Dr. Howe adopted small Roman letters and replaced the curves by angles, as Gall had done. Howe, besides embossing the whole Bible, also published a great variety of other standard works, and for many years supplied books to all the institutions of the United States.

WORCESTER TYPE.—This system was introduced into England, in 1838, by Dawson Littledale. It consists of a combination of Roman capitals and

small letters. It is the system used at Bristol, Vienna, and in some parts of the United States. It was formerly used in Paris, but is now virtually abandoned.

LOUISVILLE TYPE.—The American Printing House for the Blind, Louisville, Ky., until very recently embossed books in the Roman letter with very slight modifications. The letters are larger and much more legible than Howe's type, yet still great delicacy of touch is necessary to rapid reading in this print. The books are capitalized and punctuated just as ordinary books are, and no expense was spared to give to the Roman letter all the tangibility of which it is capable. Nevertheless, after careful consideration and much discussion at the convention of instructors of the blind held at Brantford, Ont., in 1892, it was decided to abandon the Roman letter, and thenceforth to print in no system but the New York point.

METHODS OF STEREOTYPING THE EMBOSSED ROMAN LETTER.—To obtain raised letters, Haüy used type cast in high relief and took impressions from them direct upon paper. This method has been extensively followed, but the chief objection to it is that when the type is distributed, more copies of a work cannot be had without the expense of resetting it. The better plan is to do as is done in stereotyping ordinary books: Lay damp paper over the type and brush it in well; then have casts made from these paper moulds in stereo metal. For the method used at Louisville, see account of the American Printing House at the end of the chapter. At Boston the

Roman letter was embossed by electrotype plates taken from movable type.

EMBOSSED WRITING.—Various appliances have been contrived for the purpose of embossing by hand. This may be done in a very imperfect manner by means of little cubes of wood, with the lines of the letters indicated by little pin-points projecting from the under surface. M. Foucaul, of Paris, used a slight modification of his writing-frame to write the Roman letter raised; but this machine is a very costly and somewhat complicated apparatus. None of these methods are much used now, since the Roman letter has met the fate which it so richly deserved.

No matter how the Roman letter was modified it could not be made legible enough, and consequently other systems had to be devised. The differences in form between the letters t, l and i, e and s, v and y, are very difficult to distinguish by touch. The want of sufficient tangibility rendered the Roman letter altogether unsuited to the needs of the blind. The argument that the Roman letter should be employed because it is more convenient to the sighted does not merit the consideration which some writers give to it. Embossed systems exist for the benefit of the instructed, and not for the convenience of the instructors. It would be well if this principle were more generally recognized in every branch of their instruction, that it is for the blind and not for their teachers that special schools have been built.

GROUP COMPOSED OF LINES.—Moon, Frere and Lucas each grasped clearly the true situation. The

Roman letters were too complicated in form to be made very tangible. The lines composing these letters might, they thought, be arranged into positions interfering as little as possible with their general direction, and at the same time render the letters more legible by touch. The result was that each of these persons devised a system, and each system bears the name of its designer.

MOON'S SYSTEM.—In this type we notice particularly the desire of the inventor to retain the form of the Roman letter as far as was compatible with perfect tangibility. In some letters this resemblance is real, in others it is difficult to trace, while in some it does not exist at all. The lines are bracketed together, a curved line carrying from the end of one line to the beginning of the next. When the first line is read this bracket leads the finger to the right hand end of the next line, which is read backwards to the left side. The lines, therefore, are read from right to left and left to right, alternately. The letters in the return line, as the line followed back is called, are not changed absolutely, but only relatively to the reading finger. The letters in the return line retain the same absolute position as in the advancing line, but their position relative to the reading finger is reversed.

Moon's type is very generally used in Great Britain, but is little known in America. The size of the type and the ease with which it can be read recommend it to the aged, and to those whose fingers have become hardened by toil.

LUCAS.—This system is a sort of stenographic shorthand. The letters are altogether arbitrarily chosen, and consist of lines with or without a dot at one end. It was introduced by Lucas about the year 1838. It was never very extensively used, and in it little effort is made to retain the form of the Roman letter. It belongs to this group, because its letters are composed chiefly of lines. The lines do not reverse.

FRERE.—Frere's system is also a phonetic shorthand. The letters consist of straight lines, with or without dots, half circles and hooked lines. Frere's system is simply his phonetic shorthand for the sighted, embossed. The lines reverse.

RETURN LINE. — This return line, invented by Frere and adopted by Moon, needs a few remarks, by way of explanation. In Frere's system the letters in the return line retained the same position relative to the reading finger, but their absolute position is changed. Moon, as we have seen, allowed the letters to retain their absolute position, and consequently they are reversed with reference to the reading finger. In Frere's system the finger is continually advancing, and always meets with the same side of the letter first, just as a person walks forward in one direction, and then turns and walks forward in another. In Moon's system, on the other hand, when the finger strikes the letters in the return line it touches the back of the letter first. Instead of making a turn, it is just as if a person were to walk backwards. Dr. Armitage thinks Frere's plan

the better; personally, I can see no advantage in the return line at all.

These systems of Moon, Frere and Lucas have but little interest for us here in America. They were never much used, and at present are scarcely known.

Embossing books in these systems is a very simple process, and is perhaps the best thing about them. The process is inexpensive and serves its purpose admirably. It is important, too, inasmuch as it suggests the best way to emboss better systems. This process consists in first washing sheets of tin with a solution of zinc, then placing copper wires bent in the shapes of the different letters, and when heat is applied the zinc melts and the letters become soldered to the plates. This method was first used by Frere, and has since been extensively employed for Moon's system.

THE DOT OR POINT SYSTEMS.—We now come to the most important group of these systems of tangible print. In all point systems the base is the same, and consists of an oblong of six points, three in length and two in breadth. For years the great question in America has been, and still is, whether this oblong of dots should have its length perpendicular or horizontal. The advocates of American Braille hold that this length should be perpendicular, while those of the New York Point system contend for the other view. To my mind, much useless energy and discussion has taken place in this controversy. The blind, themselves, have not

been asked to pronounce, and they are the only persons competent to deal with this question. The truth is, so it seems to me, that both systems are equally good, and both vastly superior to all other forms of tangible print in America. The ease with which they can both be acquired, and the rapidity with which they both can be written and read, combine to render this issue much less important than the parties engaged in the controversy imagine it to be. If, however, it is true that the one system is cheaper than the other the question will settle itself, for the cheaper of two equally good things is certain to oust the other in time. A person with average intelligence, a little instruction, and some practice, can acquire all these point systems in a few months. It seems to me, therefore, that this question resolves itself altogether into one of cost, and, as I have said, the cheaper must in the end prevail. As to the argument that by not having a uniformity of system the blind of one part of the world are cut off from those of another, it may be said that there never can be much intercourse between them as individuals, and that those persons who desire this intercourse are likely to be masters of all systems. In former times, when the production of embossed books was so very costly, this argument was a great factor, but the stereo machines have rendered it of little importance. The following cuts represent sections of the apparatus by which the vertical and horizontal modes of structure are formed:

FIG. 1—BRAILLE.

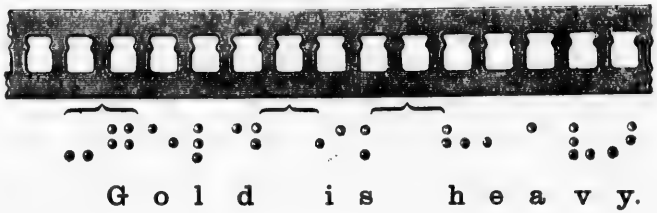
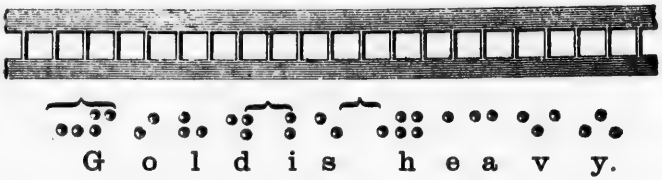


FIG. 2—NEW YORK.



THE BRAILLE SYSTEM.—The oldest and most generally used of these point systems is that which bears the name of its inventor, Braille. Louis Braille was a pupil of the Institute des Jeunes Aveugles, Paris, and introduced his system there in 1829. Now it is almost exclusively used in every European school for the blind, and has been adopted in Egypt, Mexico and Australia as well. The signs are purely arbitrary, and consist of varying combinations of six points placed in an oblong, with its length perpendicular. There are sixty-three possible combinations of these six points, a number amply sufficient for all the letters of the English alphabet, and for punctuation and contractions as well.

The Braille alphabet, though arbitrary, is very simple. The groupe of six points is divided into

upper, middle and lower pairs. The first ten letters of the alphabet exhaust all the possible combinations of the upper and middle pairs. The next ten are formed from the first by adding a lower back point to each of the first ten letters. The third row is similarly formed by adding both lower points to the first row. The fourth row is formed by adding the lower front point to the letters in the first row. The only letter of the ordinary alphabet in the fourth row is W, which is derived from J. The reason for this is that W does not occur in genuine French, and it was thought better when constructing the English alphabet to give to W an odd place than to alter the significance of the last four letters of the original Braille alphabet.

In order to avoid that confusion which often arises in the minds of beginners through the expression right and left points, the points are numbered: Upper Pair, 1-2; Middle Pair, 3-4; Lower Pair, 5-6. The beginner is apt to think that because the writing is from right to left, and the reading from left to right, it is necessary to note whether as is written or as is read, is meant. No such distinction is needed, for both in reading and writing the movement is always forward, and the part of a letter written first is the part read first.

The last five signs of the third row and the first nine of the fourth are used in French for accented and modified letters, and in English for groups of two or more letters. By the use of these contractions in English, while the correct spelling is not interferred

with, a saving of 25 per cent. is effected. The value of a few contractions will be made clear when it is remembered that the finger has not, as the eye has, the power to take in a considerable area at once. It can only report on that which lies in immediate contact with it. So that the greatest amount of meaning that can be crowded into the fewest possible signs conduces to the most rapid reading by touch, provided, of course, these signs have each their own meaning, and are well defined. In England single signs are made to stand for fixed groups of letters, and the initial letters of common words stand for the words themselves. In France and Germany some contractions are also used, but as in French the signs used for groups of letters in English have been made to stand for accented letters, and in Germany for modified ones. Their systems of contraction are necessarily much more complicated than the English contractions.

THE BRAILLE WRITING FRAME.—The chief advantage of the Braille over all previous systems is that it can be as readily written as it is easily read. A brief description of the appliance for writing this system is absolutely essential to any account of it. This appliance is neither complicated nor expensive. It consists of a grooved metal bed, which contains ten grooves to the inch, and over which is fitted a brass guide punched with oblong holes, of which the dimensions are 3-10th by 1-5th of an inch. This perforated guide is fixed into a light wooden frame, which is attached to the grooved metal bed by hinges. The

paper is placed between the frame and the grooved bed. The instrument for writing is a blunt awl, called a stylus, which carries before it a little cap of paper, thereby making, upon the under surface of the paper, dots arranged in the forms of the letters of the Braille alphabet. As the reading is from left to right, the writing is from right to left. This, however, presents no difficulty as soon as the learner understands the numbering of the points. The brass guide has two rows of oblong openings or cells, which make it

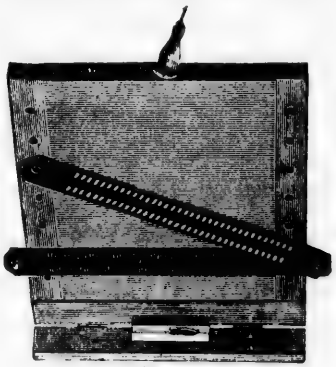


FIG. 3—BRAILLE INTERLINING FRAME.

possible to write two lines without shifting the guide. When the first two lines are written the guide must be moved down until the little pins projecting from its under side drop into corresponding holes in the frame, then two more lines may be written, and so on to the end of the page. The foregoing description applies to the frame invented by Braille himself, and which is still used in France. The English frame is somewhat different. The metal bed is not grooved,

but marked by little groups of cups, each group containing six cups. The guide is so hinged to this bed that when the frame is locked its openings correspond exactly to the groups of cups. The guide and bed are moved as one piece down the board, which is so arranged as to give the exact distance between the lines. These lines are separated by a wide interval. When the first page is finished the second is written on the back of it in the intervals between the lines of the first. This is called interlined writing. Besides rendering the print more legible a saving of space, equal in amount to 20 per cent., is effected over the original French frame.

A very neat pocket Braille writing tablet is manufactured in Philadelphia. It consists merely of a brass guide, containing four rows of cells and a metal bed with four rows of cups. This tablet is very convenient for carrying about, is not expensive and produces very good print.

As the Hall-Braille Writer and the stereotype-maker have not yet been generally adopted for producing the Braille, I shall describe them in connection with American Braille.

PRINTING BRAILLE.—Most of the books printed in France have been stereotyped directly from movable type. Latterly, however, many books have been prepared from brass plates, made by placing in a writing frame, similar to the ordinary one, sheets of brass, and stereotyping them with a hammer and punch. The pits on the back of these sheets are filled in with solder, thus obtaining good and durable plates.

In England, the British and Foreign Blind Association prepared the plates for their first books in the way just described, but to avoid trouble and expense the pits were filled in with cement, and a sheet of paper was glued on the back. In 1869, the plates for the "Village Blacksmith" were thus prepared. Since then many editions have been printed from them, and they were still in good order in 1885, and, as far as I know, are yet intact.

The later books published by this association are printed from interlined plates. The frame for producing interlined stereo plates is very similar to the ordinary writing frame, only stronger and heavier in all parts. A doubled sheet of brass is embossed with a punch and hammer, in this frame, just as in the ordinary frame a sheet of paper is written. These plates, prepared entirely by the blind, are light, inexpensive and durable.

For this somewhat lengthy account of the Braille system, I have obtained much of my information from Armitage's book.

Louis Braille.—Perhaps the most of the advance in improving the facilities for educating the blind was made when the Braille system appeared. A short biographical sketch of its inventor, therefore, should not be omitted from any account of the education of the blind.

Louis Braille was born in France, about twenty-three miles from Paris, early in the year 1809. When three years old the child met with an accident, which ended in the loss of sight. His father was a harness-maker,

and little Louis, as is the wont of children, was one day playing at his father's trade, when the sharp instrument with which he was working slipped up and put out one of his eyes. Sympathetic inflammation set in, and soon the other eye was also destroyed. At the age of ten he was sent to Institute des Jeunes Aveugles, in Paris, where he was remarkable for his varied talents and assiduous application to work. Mathematics and music were his chief delights, and he attained great proficiency in them. The embossed Roman letter was the only form in use at Paris when Braille was a pupil there. In 1826, he became a teacher in the institution where he had so distinguished himself as a pupil. He taught grammar, geography, history, mathematics and music. He was as successful a teacher as he had been a pupil. At a very early age he recognized the fact that the embossed Roman letter was altogether unsuitable for the blind, and he began to search for and devise better characters. Among the existing ideas of systems, that of M. Barbier, an artillery officer, seemed to him most likely to prove satisfactory. Barbier's characters consisted of twelve points, arranged in an oblong of six pairs of points. Although a great number of signs might be made from this group, Braille knew that the finger could not cover a single character at once, so that rapid reading could never be attained in this system. Barbier's idea, nevertheless, was right in principle, as Braille's development of it proved. In 1829 appeared Braille's first treatise on his new system, and a fuller explanation of it in 1834. The

blind were not slow to recognize the vast superiority of the new system over all previous methods, though the school authorities would have none of it. Braille, however, continued to advocate and teach his characters; and this much may be said for the Paris authorities, that if they did not approve of the new system, they did nothing to prevent its being taught. It is a curious fact that every new thing has to contend with so much opposition and indifference. It was not until after Braille's death that his system was adopted in the Paris school. Soon after completing his system for literary work Braille adapted it to musical notation. It proved itself as well suited to the embossing of music as it had done for the embossing of books. Throughout Europe the Braille musical notation is as generally used as the Braille alphabet itself. Besides obtaining the idea of his system from Barbier, Braille's writing-frame was merely a modification, though a very great one, of a frame which Barbier had designed for his own system.

Braille was only twenty-six when his health began to fail. His decline was very gradual, and he died of pulmonary consumption in 1852, in the forty-fourth year of his age. As a man, Louis Braille was a true friend, a wise counsellor and an earnest Christian. Many are the stories told of his goodness, wisdom and generosity. Space does not permit me to dwell longer on this sketch, but I cannot close without inserting this glowing tribute which the late Dr. Armitage pays to the memory of Braille: "All that was mortal of

Louis Braille has long since crumbled into dust, but the influence of his spirit is more widely felt now than at any former period. There is scarcely a school for the blind in the whole world in which his system does not form the basis of education. It is true that in many of the States of North America another system is used. This, however, is derived from the Braille, and answers much the same object."

THE NEW YORK POINT SYSTEM.—Dr. Russ, of New York, made two important alterations in the Braille system. In fact, he so modified it as virtually to produce a new system, and which has since received the name of "The New York Point System." Russ thought that the length of the oblong of points should be horizontal instead of perpendicular. Greater rapidity in writing and a considerable saving in space were the chief reasons urged in favour of this change. In choosing what particular combinations of points should stand for particular letters, Russ abandoned the simple fixed rules which Braille had devised and adopted as the governing principle of selection that those letters which recur most frequently in the language should be represented by the least number of points. Russ thought it a waste of space that every letter should occupy an equal amount. To remove these supposed defects it was necessary to change the direction of the length of the oblong of points. Shortly after devising the system Russ gave it to Mr. W. B. Wait, Superintendent of the New York School for the Blind, in order that a practical test of its usefulness might be made. Mr. Wait

became so thoroughly convinced of the great worth of this system that ever since he has been its most powerful and enthusiastic advocate. It has been mainly through his influence that so many of the American institutions have adopted the New York Point, and chiefly through his efforts was it that the convention at Brantford, in 1892, decided to print nothing but books in this system at the American Printing House, Louisville. Mr. Wait also adapted the system to musical notation.

THE NEW YORK POINT ALPHABET.—Here there is no such guide to memory as the Braille alphabet affords. This absence of mnemonic rules is of little practical importance, except when persons who have become blind late in life wish to learn to read by touch. Braille's rules assist such persons to master his system with ease, while the absence of such rules in the New York point often discourages them at the outset. As has already been said, letters recurring in English the more frequently are represented by the fewer number of points, while those of infrequent occurrence have a larger number. E and T, which occur most frequently, are represented each by a single point, while Z and X, which are the most infrequent, have each five points. B, G, K and Q are composed of four: M, L, D and R contain three; A, I, N, O and S are made up of two. In each case it will be seen that the more frequent of occurrence a letter is the fewer are its points, and *vice versa*. There are also several abbreviations. These, besides effecting a great saving of space, considerably facilitate both reading and writing.

The brass guide used in writing New York point is similar in principle to the English Braille guide. In the bed the New York guide has, instead of a triple row of equidistant pairs of cups, a double row of equidistant cups; in the upper part the cells are square instead of oblong. These differences are due to altered position of the length of the six points. Pocket slates for this system are also manufactured in Philadelphia. The speed attainable in writing the New York system is equal to, if not greater than, that attained by the majority of sighted persons in the ordinary freehand writing. I have myself made experiments in this particular, and can therefore speak upon it with some assurance. It is also claimed that New York Point can be, as a rule, written faster than the Braille. This is a point conceded by the advocates of Braille, and is of some practical importance in determining which is the better system. The improved methods of writing these systems, however, may make considerable difference in the speed attainable in this system, and I am not aware that any experiments have been made to see which can be written the faster.

American Braille.—An important modification of pure Braille is extensively used in many of the American institutions. It had its origin in Boston, and though Armitage thought that it would soon die out, it is every year becoming more and more popular. It was invented by a blind gentleman, Mr. J. W. Smith, formerly head of the Tuning Department of the Perkins' Institute, and now Editor-in-Chief of the

Mentor. In American Braille the perpendicular length of the base of six points is retained, while Russ' principle of representing the most frequently recurring letters by the smallest number of points is adopted. This system is used by some of the best schools for the blind in America—Boston, Philadelphia, Missouri and Illinois all employ it. For this system the Hall-Braille writer and stereotype-maker were invented, and these alone will serve to render the American Braille immortal. Further, if it is true, as is sometimes asserted, that the stereograph will not work, the American Braille is bound to become the dominant system in the United States; but as the difficulty of the stereograph can only be one of spacing, a difficulty which has been overcome in such a variety of ways in the manufacture of typewriters, it seems to me that this difficulty can be overcome. There is no reason, however, for continuing to employ the old methods of stereotyping in New York Point until the stereograph is perfected, when the stereotype-maker is an accomplished fact, a perfectly workable appliance. The American Printing House had better look to itself in these matters, as a long-suffering Congress may require an account of it some day.

Recent Inventions for Writing and Stereotyping American Braille.—Formerly the American Braille was written and stereotyped just as pure Braille is now. It was written by means of a frame similar to the European and stereotyped by similar processes. The New York point also was embossed by what were practically the same methods; different

in detail it is true, but, nevertheless, the principle involved in both was identical. Within the last few years a great change has been brought about through the invention of new appliances. As we shall see these inventions are not complete departures from former methods, but merely a better way of producing the same results as were formerly attained. First among these inventions comes the Hall-Braille.

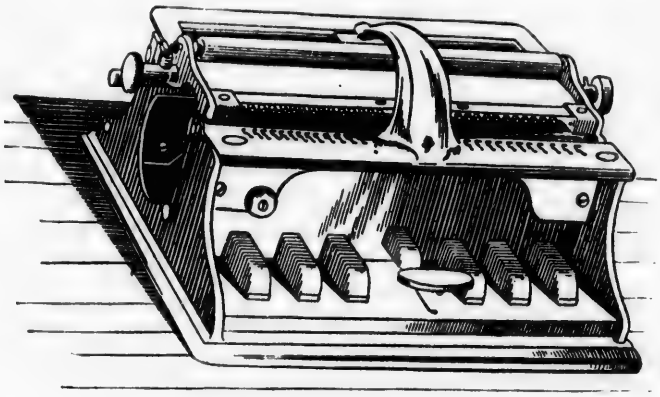


FIG. 4—THE HALL-BRAILLE WRITER.

THE HALL-BRAILLE WRITER.—I copy the following description of the Braille writer from the sixtieth annual report of the Philadelphia School, and which description is there taken from the *Mentor* for September, 1892:

"The machine has but six keys. Each of these, by means of a lever, operates a stylus. The styluses are grouped together, making the Braille cell. The plate through which they pass upward is horizontal and is

on the back and upper part of the machine, just behind the small roller, shown in the cut. A "goose-neck" is firmly fastened to the front casting, and passes over the roller and ends in a small piece of metal in which are six cavities to receive the points of the styluses. The paper is coiled in the central part of the apparatus, and moves from right to left with the carriage. The motion of the carriage is automatic, the releasing of any one key that has been depressed (or of all the keys or the spacer), causing the carriage to move as far as the width of the Braille cell. The paper passes beneath the roller shown in the cut, between the tip of the "goose-neck" and the plate which guides the styluses, and when a line has been written out upon a small horizontal surface, where it can be read. Indeed, as the tip of the "goose-neck" is only a little wider than the Braille cell, all the writing done may be read at any time except the last letter written.

As the six keys, or any number of them, can be depressed simultaneously, any Braille character can be written at a single stroke. As now constructed, the size of letter and length of line are the same as the "Crandell tablet."

The Braille writer is a machine of the same use to the blind as the typewriter is to the sighted. Theoretically the speed attainable on the writer is greater than that attainable on the typewriter. Practically a speed of fifty to sixty words per minute is the average rate attained, though one hundred words a minute have often been written by fast

operators. Theoretically the advantage is explained by the fact that on the Braille writer there are only six keys, and that the hands can cover all the keys at once. Practically part of this advantage is lost in the strain of keeping the hands in the one position for any long time.

THE STEREOTYPE-MAKER.—When Mr. Hall had finished his wonderful contrivance for writing on paper, he began at once to see if he could not make it write on brass. The result was his magnificent stereotype-maker. In principle it is identical with the Braille-writer. Its differences in detail are only made necessary by the different character of the material upon which it is intended to write. These differences are so well shown in the cut that I need not describe the machine in detail. The best account that I can give of it is to set forth its achievements.

The first stereotype-maker was completed January 4th, 1893, by Harrison & Seifried, Chicago; since then twelve have been sold in order of time as follows: Illinois Institute, Missouri Institute, Pennsylvania Institute, Perkins Institute, Minnesota Institute, Tokio Institute, Japan; Perkins Institute (2); Norwood, London; British and Foreign Blind Association, London; Steglitz, Germany; Sidney Institute, N.S.W.; California Institute.

In less than two years after its invention this machine has found its way all over the world. It must be remembered that each one of these machines is a printing plant, capable of turning out more books in a year than do all the other printing houses for

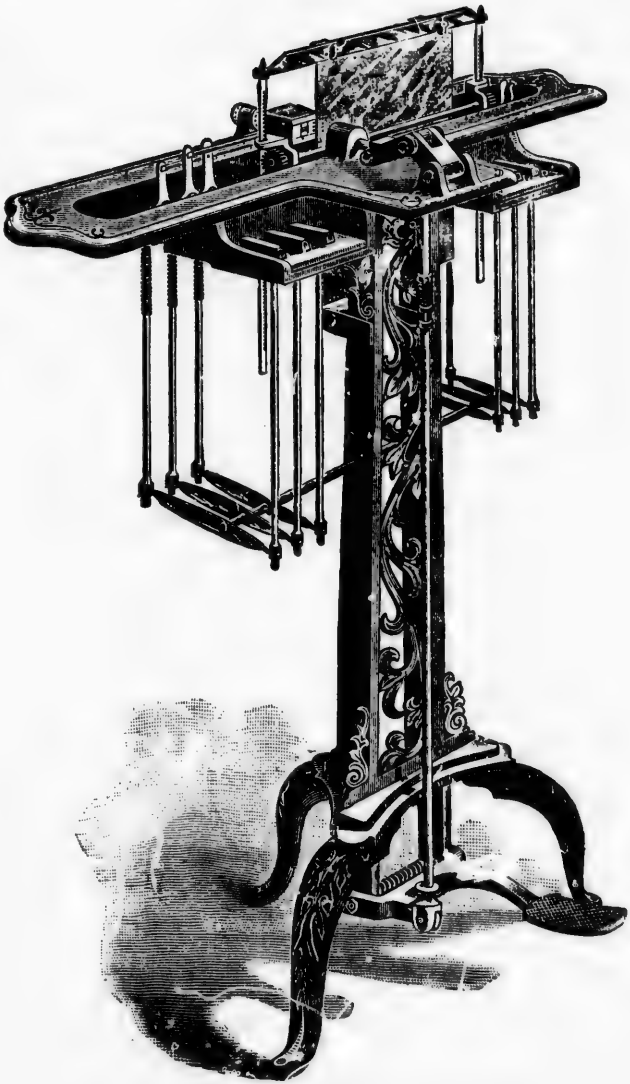


FIG. 5—THE STEREOTYPE-MAKER.

the blind in the world. Those American institutions, where it has been introduced, all give a good account of it, and their reports are full of its achievements. What it has done is indeed considerable, as an examination of the reports of Pennsylvania, Missouri and Boston will show, but it is as nothing when compared with what may fairly be expected of it in the near future. By it books can be produced at a cost very little greater than that for ordinary ink printing. The actual cost of setting is less, as shown by E. E. Allen's elaborate calculations in one of his late reports. Mr. Allen tells me that their machine has stereotyped more this year than in the previous year. If this great work goes on, as it can hardly help doing, it will not be long before the blind will be almost as well provided with books to their taste as the sighted are.

The brass plates produced by the machine are very durable, and may be made either single or double for interlining. The paper copy may be made from these plates by placing damp paper on the stereotyped plate and passing both through an ordinary clothes wringer. Thousands of copies may be struck from one plate without any sensible difference between the quality of the first and last impressions, and without any injury to the plate itself. The price of the machine itself is $150.00, and for another $50.00, clothes wringer, hammer, punch and flat-iron may be purchased, thus the whole outfit of a printing house can be bought for $200.00. It is greatly to be regretted that Ontario employs the New York Point system,

because as yet Mr. W. B. Wait's machine, the stereograph, is not on the market, and we have lost two years' worth of cheap books. This thought brings us naturally to the consideration of Mr. Wait's machines.

THE KLEIDOGRAPH.—The Kleidograph (key-writer) was invented by W. B. Wait. It is but an application of Hall's machine to the New York Point system, and is intended to answer the same purpose as the Braille-writer. The following description of the Kleidograph is taken from Mr. Wait's report to the Board of

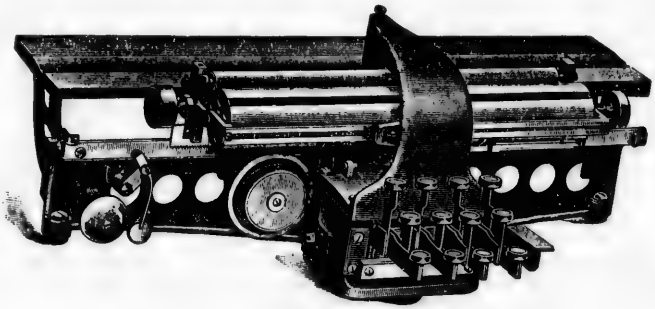


FIG. 6—THE KLEIDOGRAPH.

Managers of the New York Institute for the Blind, for the year 1894:

"The manual consists of twelve embossing keys and a space key, the former being arranged in three rows, stepwise, one above the other. The eight keys of the two upper rows correspond with the fourth base form of the New York Code, viz., : : : :

For convenience the keys are known by numbers, in the same manner as the points in the foregoing sign; those in the upper row as 1, 3, 5, 7, and those in

the row next below as 2, 4, 6, 8. At the back end of the key-levers are the eight embossing styluses, or stylets, each of which corresponds in position and action with the key having the same number. Thus Key 1 actuates Stylet 1 and produces Point 1. If the manual were provided with only the eight keys above described, the use of both hands would constantly be required in operating the keys. One of the most important labours of the student, however, is that of making written notes while reading from books. While so engaged one hand should be free for reading and keeping the place on the page, while the other should manage the key-board. This important object is fully attained by means of the supplementary keys of the lowest row, each of which, when pressed down, will carry with it the pair lying directly above it. To distinguish these keys from the eight primary ones they are called Compound Keys, and are known by the ordinal names, first, second, third and fourth. The efficacy of this mechanism will appear when it is seen that eight points are made at a single movement by the use of only four fingers of one hand.

"The paper carriage consists of a light frame carrying a slotted cylinder of thin metal, and provided at the right hand end with a fixture, by which the cylinder may be revolved at will. The paper may be of any width up to ten inches.

"Having first passed the sheet between the rubber feed rolls, and properly inserted one end of it in the cylinder, the paper, by gently turning the cylinder, is neatly wrapped around it until the head of the sheet

is brought to its proper position, which is indicated by the head line edge, formed by a bevelled depression in the reading board. It is important that the insertion of the paper should be effected easily and correctly. This has been amply provided for as follows: First, the paper rests evenly and conveniently on the reading board; second, it can be squarely adjusted against the inside of the cylinder; third, when being drawn in it can be lined up with the outer edge of the board, and finally with the head line edge. It is equally important that the forward feed of the paper from line to line should be true, as otherwise the lines would not be parallel upon the paper, and might run entirely off at the bottom of the sheet. Accuracy in this respect is secured by substantial feed rolls of metal, covered with rubber."

The kleidograph will write either literature, music or mathematics, according to the New York Point system. The machine, like the Braille writer, will permit any degree of speed which the operator can attain. So far as I can learn these machines are as yet used only in the New York Institute; where upwards of one hundred are in daily use in the educational work of the school, and are giving good satisfaction. I learned this from some correspondence which I have lately had with Mr. Wait regarding the machine. I wished to purchase two of these machines, but Mr. Wait informs me that he cannot fulfil the order at present, but has filed it for reference.

THE STEREOGRAPH.—This machine is a development from the kleidograph, and, like it, is a

practical accessory of the New York system, but of broader character and use. The special work of this machine is to emboss metal plates ready for printing New York Point. The action of the machine is light

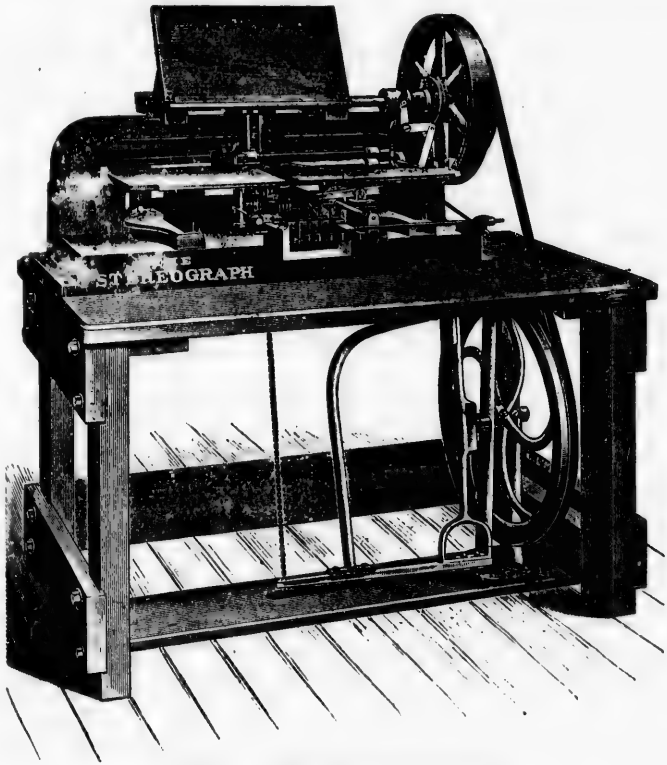


FIG. 7—THE STEREOGRAPH.

and quiet, and its management is easily learned. The stereograph's details are different in every particular from those of the kleidograph, except that the key-board is the same; but the principle is identical.

Like the stereotype-maker the stereograph's styluses are driven by foot-power. The operation of the machine is thus described in Mr. Wait's report:

"The carriage being in place at the right hand end, with the front feed rolls open, the metal plate is inserted and adjusted between the stylets and the impression plate, after which the feed rolls are closed upon the plate, thus firmly holding it in place on the carriage. Motion is then imparted by the treadle to the driving-wheel, which primarily turns upon its bearing as a loose pulley, ready, however, to be firmly engaged with its shaft by the action of the keyboard. By depressing the spacer or any of the embossing keys, the following results are produced: First, the stylets required for any chosen letter or sign are selected; second, the feed pawl is thrown forward from one to five teeth of the feed rack, thus determining the throw of the carriage, which will correspond to the length of the sign last made; third, the driving-wheel is thrown into engagement with the shaft, thus imparting motion to the embossing plate by means of an eccentric connection with the shaft at the left hand end; fourth, by means of the slotted cam, shown in the enlarged part of the shaft at the right, motion is transmitted through a lever and intermediate connections with the shaft at the left hand end. When nearing the end of the line notice is given by a signal bell. When the end has been reached the metal plate is thrown forward for the next time by means of the feed-rolls, which are operated by the milled thumb-piece at the right hand end

of the carriage. The feed pawl is then disengaged from the rack by lightly pressing a lever, placed just below the table, and the carriage is gently restored to the starting-point by the tension of a spring, which also serves to prevent an overthrow of the carriage. In this manner line after line is embossed until the sheet has been filled. In regard to speed the machine will be limited only by the capacity of the operator."

I have quoted Mr. Wait's descriptions of his machine so fully, partly because these inventions have yet to establish their usefulness and efficiency, and partly because they are the machines in which we of Ontario take the most interest, as they are designed to do work in the system which we use here. Some time ago I wrote to Mr. Wait regarding the stereograph, and on behalf of the Blind Self-help Club I ordered one. In December of last year (1895) I received the reply that no machines had yet been completed except the model, but that the castings for some were being made. We have decided to wait for the stereograph for a while, but if it does not soon materialize we shall order a stereotype-maker and endeavour to introduce American Braille, as we consider a change of system a less evil than a long delay.

There are several other point-writing and point-printing machines which space does not permit to describe. Among them the punctograph and the Orindorf press may be mentioned. The punctograph is an ingenious contrivance for writing either Braille or New York Point. It may be of use in schools using both systems, but where only one is used,

either the Braille writer or the kleidograph will be found more serviceable. The Orindorf press is an invention for dry printing. Further information about it may be obtained from the inventor himself —Orindorf, Worcester, Mass.

Our review of appliances is ended. We can see progress in all these inventions. Each new invention is an outgrowth of some previous one. Step by step we can follow this development from Barbier's frame to the stereotype-maker and the stereograph. We have now only to notice what in theory is the grandest triumph of the educators of the blind. A whole nation has been led to recognize the importance of providing for the education of its blind children, and the American Printing House was the result of this recognition.

THE AMERICAN PRINTING HOUSE FOR THE BLIND.—This noble monument to the wisdom and goodness of a whole people is located at Louisville, Ky., and was chartered by the Legislature of Kentucky in 1858. By an Act of Congress approved March 3rd, 1879, the Secretary of the United States Treasury was directed to invest the sum of $250,000 in 4 per cent. United States Bonds, and to pay to the treasurer of the American Printing House the interest accruing on this investment. For sixteen years therefore the American Printing House has received from this source the sum of $10,000 annually, and by it has been enabled to supply to the American Institutions books and tangible apparatus free of charge. No act can well be imagined more calculated to minister

to the needs of the blind, and yet such is the perversity of humanity that this magnificent institution has been allowed to become a cudgel in the hands of one contending faction for the purpose of closing out the Braille. For three years the stereotype-maker has been an accomplished fact, a plant which can be obtained at one-tenth of the cost and operated at one-fifth less than that of the American Printing House, and yet the American Printing House sticks to the old methods and appliances of embossing. Not a single instrument has been purchased at Louisville. This is not all. Besides refusing to adopt cheap methods the authorities of this institution have endangered and jeopardized the privileges of the blind by violating the conditions of the Act making the grant. They have received plates from institutions and charged more for the books made from these plates than these books cost them. This action is distinctly a violation of the third clause of the Third Article which clause says that no profit to the Printing House shall be put on any book furnished to the American institutions under the provisions of the Act. If this grant were withheld it might never be restored. Surely the general welfare of the blind should be better taken care of by these, its most important guardians.

With a view of showing how vastly superior the new methods are to the old I copy from Dr. Armitage's work on the "Education and Employment of the Blind" the following account of the old methods of stereotyping now in use at the American Printing House for the Blind:

"Movable type is first set up; then a mould is made by pasting three sheets of paper together, the fibre of which has been partially destroyed by slight charring, which is effected by dipping the paper for an instant into molten stereo metal. This is done to destroy any tendency of the paper to shrink. The paper is then moulded by pressure on the movable type, and the paper mould is then taken to the 'flask.' The pitted side of the paper lies against a diaphragm, then the melted metal is poured in so as to take a cast of the raised side of the paper (this metal cast only serves as a support for the paper mould in the next operation). Next the flask is opened; the diaphragm is removed, and a thin sheet of tin is laid on the pitted surface of the paper mould; a sheet of paper on this; the flask is again closed, and about twenty pounds of molten metal are poured in, which, when cool, gives a slab about five-eighths of an inch thick. The sole object of pouring in this molten metal is to melt the sheet of tin next the paper mould, and the molten tin running into the pit takes an exact casting; the next process is to re-open the flask and remove the thick plate of metal with the sheet of paper, separating it from the tin plate, the back of which is now exposed, forming an exact mould of the original paper cast. A stout sheet of tin is now applied over it, and outside of this a projecting sheet of paper. The flask is again closed and molten stereo metal is poured in as before. This melts the second sheet of tin and firmly incorporates the two together. The flask is again opened, the stereo-metal

plate which was first moulded to the raised surface of the paper mould, with the object of supporting it during the subsequent operations, is removed, as also the plate resulting from the last pouring in of molten metal. These slabs are again put into the ı ng pot to serve for future operations, and the thin plate of tin is removed, which is now an exact copy of the paper mould. The edge of this is now slightly bent over to fit the cylinder of the press. This is worked by a steam engine of three-horse power. The cylinder works against an india-rubber cylinder; four sheets are printed at a time and cut automatically, and delivered ready for the binder. The cylinder makes about fifteen revolutions per minute, which gives a speed of printing of sixty sheets per minute The printing is all done on one side of the pape The books are well bound."

This account shows how elaborate and, consequently, how expensive stereotyping by the old method is. The difference in cost between stereotyping in this way and in that by the stereotype-maker may be shown by saying that the cost of stereotyping a plate by the the stereotype-maker is not greater than the first and simplest operation of the Louisville method—the setting of the movable type. For several years the stereograph has been promised us, but as yet it has not appeared. Its friends had better produce it soon or the New York Point must go.

The Braille, the New York Point and the American

Braille are the three great point systems. With regard to the respective merits of each I have nothing to say. Any one of the three is vastly superior to all other kinds of embossed letters. Personally I have little preference, though, if I had my way, the New York Point would be universal; that is, provided it can be as cheaply produced as the others. I do not believe the New York Point to be any better than the American Braille; I am more familiar with it, that is all. I imagine that if the "British and Foreign" had inquired into their reasons for deciding in favour of the Braille, they would probably have found theirs' similar to mine for preferring New York Point. It must not be forgotten, however, that the very fact that such a body of men as the "British and Foreign" has decided in favour of the Braille, puts that system in the highest place, because they were all men of liberal education, of independent means, free from the influence of extraneous motives, such as must always hamper those officially connected with institutions. Since we can never hope to find any body of men more competent to judge, their decision has considerable weight. We cannot expect to find men free from the prejudices to which I allude.

It is both interesting and amusing to note that several attempts were made to make the six points at the base of the Braille system conform, in their combination into letters, to the forms of the Roman alphabet. This was pushing the determination to stick to the form of the Roman letter to a point where

it becomes ridiculous. After the vast amounts of money which have been worse than wasted to establish the Roman letter, it is amusing to observe the last efforts of this expiring idea to destroy the triumphant Braille. Hughes, of Manchester, made one such attempt, but his system has long since become obsolete. Another and a more successful one is that of the Abbe Carton, of Bruges. When we consider that the Abbe succeeded in introducing his system into Bruges, where it still remains, this adhesion to the Roman letter ceases to be amusing and becomes exasperating. The pupils of Bruges, through this idiotic idea, have been effectually cut off from all the embossed books published at Paris in their own language. It may seem strong to call this idea idiotic, but try for yourself to produce the forms of the Roman alphabet out of the six points at the base of the Braille, and find any other name for the idea if you can.

CHAPTER IX.

PRIMARY EDUCATION.

PRIMARY education has different constituents in different countries. In Ontario it is made up of reading, writing, arithmetic, grammar, history, geography, temperance and physiology. In other States, other subjects are included. Whatever constitutes primary education in any State or Province should constitute the primary education of the special school in such State or Province. The importance of observing this plan is that the blind may be taught to look upon the elements of education just as their sighted neighbours, to avoid the misfortune which sometimes happens from allowing the blind to imagine that knowledge of some particular subject makes them highly educated, while the sighted are taught to consider ignorance of such a subject almost a crime.

I cannot insist too often upon the importance of the blind differing as little as possible in their thoughts and actions from the sighted. Throughout the whole of the education of the blind the fact that they are to live for the greater part of their lives among the sighted should never be forgotten, and it is essential to their welfare that they be like other people.

READING.—The blind should be taught the art of reading from the same text-books as the sighted, and

should take up these text-books in the same order and series. The chief importance of this is to establish a bond of sympathy between blind and sighted children. In fact, use of the same text-books throughout the whole course of education serves not only both the blind and the sighted to gauge each other's degree of culture, but also to unite them in thought, memories, hopes and ambitions. Particular attention must be paid to correct spelling by the instructors of the blind, for their pupils are peculiarly liable to mistakes in orthography, and such mistakes are usually thought to be heinous offences by educated people. The blind are less likely to err in spelling now than formerly. Phonetic spelling and the limited number of books in raised letters, coupled with the difficulty of reading them, were the chief causes which tended to destroy correct spelling. Phonetic spelling has now been virtually abandoned in books for the blind, and the greater tangibility of the books published recently makes it easier for the blind to notice the spelling. Formerly the whole attention was required to make out the words into sentences, even yet there are so comparatively few books embossed that special instruction in orthography is absolutely essential, if they are to avoid the ridicule attaching to incorrect spelling. The blind must carry on correspondence with the sighted both in business and in private life, and correct spelling is a condition both of social and business success.

WRITING.—We have now come to a problem which has not yet been satisfactorily solved. To succeed in

any kind of business it is almost impossible to dispense with letter-writing. The question is, How are the blind and the sighted to communicate with each other by correspondence? In case of frequent or friendly communication it is no doubt best for the sighted to learn one of the point systems, but where the sighted correspondent does not know any of these the blind must learn to write some character that can be read by sight. As yet no means have been invented to enable both the sighted and the blind to read and write one and the same system of characters.

PENCIL WRITING.—Many contrivances have been made to enable the blind to write the ordinary written characters with the pencil. Most of these appliances are for keeping the lines straight, and presuppose that the blind have previously learned to write. Among the most elaborate are Wedgwood's noctograph, Thursfield's writing apparatus, and Pooley's writing-frame. The British and Foreign Blind Association and the American Printing House manufacture a pencil card made of corrugated cardboard, on which the paper is laid. The grooves can be easily felt through the paper, and form a sufficient guide. The best and cheapest method, however, is simply to take a sheet of paper and fold it back and forth like the folds of a fan, when the paper is spread out it is crossed at regular intervals by a succession of creases which can be easily felt, and serve to keep the lines straight. If the paper be folded continuously the lines nearer the bottom will be wider than those nearer the top, but by folding it over and back the lines are kept of equal width.

Those who have never learned to write, or have forgotten how, require guidance in forming the letters as well as in keeping the lines straight. Gall, Hebold, and Guldbegg each invented a neat contrivance for this purpose which answers very well. Haüy and Vitali used a glutinous ink for writing to the blind. Vitali's was much superior to Haüy's, because it hardened into smooth letters, while Haüy's became disagreeably rough by reason of the sand dusted over it. The great value of Vitali's ink is that it may be used to give to the blind an idea of the form of the letters, and this is all that is wanting to those who have never learned to write before losing their sight.

Several clumsy and expensive arrangements have been invented for the purpose of producing letters which can be read both by sight and by touch. Among the best are Count de Beaufort's stylograph, Faucaud's apparatus, and Hughes' typograph. Such contrivances are very useful for giving to the blind, who have never learned to write, an idea of how it is done. But when this idea has been obtained, the pencil card or folding method is of far more practical use. The reason that tangible, freehand writing is easily learned by the blind is that any deviation from the proper shape of the letter can be noticed by touch.

The type-writer is by far the best means for the blind to write to the sighted. Instruction on this instrument should form a part of the regular course of study in every school for the blind. Many of the American schools teach it, and speak very highly of its usefulness. Any of the better grades of type-

writers can be managed by the blind. The printer's copy of this book was prepared by me on a Blickensderfer machine, which is light, portable and eminently satisfactory.

This machine weighs six pounds, has a full keyboard, and costs only $45. A good type-writer should form a part of every graduate's outfit, and it would be of inestimable value to him, no matter in what business or walk of life he may happen to enter.

ARITHMETIC.—The study of the science of numbers has long been a favourite pursuit among the blind. The manner in which many of them manipulate figures has also long been a source of surprise to thinking people. This love of arithmetic is due to the predominance in the mental life of the higher intellectual activities. Mental arithmetic has formed a part of the education of the blind ever since its beginning. The most retentive memory, however, is hardly sufficient to retain in the mind all the data of an intricate and involved arithmetical calculation. Many appliances have been contrived to assist the blind in these operations. One of the earliest was a calculating board, invented by Nicholas Saunderson, of whom we have already heard. This frame consisted of perforated metal, into which ordinary pins were dropped. The different numbers were formed by variations in the grouping of these pins. Another calculator has square holes, into which are dropped square pins, which have cast on them the nine Arabic numbers and the cypher. Calculations on this board are in miniature the daily routine of a printer setting up and distributing type. They

are too tedious for arithmetical work, though, doubtless, such type are of value to give to the younger pupils an idea of the way in which problems are ordinarily demonstrated. The pentagonal and octagonal boards are further developments of Saunderson's plan. Instead of having a separate type for each number the different numbers are indicated by the different position of the type with reference to the calculating board. Dr. Armitage considers the octagonal board the best means for calculating, and differs from the practice of the Paris School, where the Braille frame is used. The doctor's objections to the old frame are valid, but the Braille-writer and the kleidograph are not open to them. For in these machines the paper does not have to be reversed many times in a single lengthy operation, but a number may be struck with one hand and felt with the other the very instant that the keys are released. The Braille-writer, by producing the points on the upper instead of the lower surface of the paper, renders arithmetical work much easier than by any calculating board; and the rapidity with which figures can be written down gives it greater advantage.

GRAMMAR.—Here the only point to be insisted on is the use of the same text-books. To speak grammatically, is even more important than to spell correctly. Incorrect speaking grates on the educated even more than incorrect spelling, and must therefore be guarded against very carefully.

HISTORY.—This is a favourite study of the blind. Their retentive memory takes care of those minute

details, such as names and dates, so disagreeable to many students. I have no special comment to make upon this subject, except that a variety of historians should be within the reach of the pupils, and in no case should the teaching be altogether oral.

GEOGRAPHY.—For a long time no satisfactory means was found whereby the elements of geography might be taught to the blind. It was very hard to impart to them a general idea of the earth—its motions and the physical features of its surface. Finally, this difficulty was removed by M. Heller, Director of the Jewish Blind School at Vienna, who introduced the plan of beginning with the construction of plans of the school-room and play-ground. The pupils themselves were taught to make these plans, and gradually the drawing of rough maps, by means of pins and strings upon cushions, was introduced. Besides giving an idea of varying outlines and boundaries, this method formed a good manual exercise, by advancing from concrete ideas of the immediate neighbourhood to larger and larger areas, a good general notion of the earth's surface was at last obtained. Map drawing by pins and strings may be followed by the drawing of maps or figures on paper by means of the point frame and stylus, or of a dressmaker's ordinary tracing wheel. The latter is very useful in studying geometry, as curved as well as straight lines can be made with it.

MAPS.—All methods of map drawing, however, can serve to produce only the outlines of various geographical features. It is necessary, therefore, to

construct maps which will furnish the details. This has been done in several ways, the best of which is by constructing large wooden maps that may be dissected. In the map of Europe, for instance, each country is represented by a single piece of wood which fits into its place on the map just as a section of a puzzle. Variations in coast and boundary lines are marked by variations in the shape of the piece. All the pieces, when put together, present to the eye a perfect wall map. Mountain ranges, railways, cities and towns, are marked by different headed tacks, and the lakes and rivers are cut into the wood. The sea is kept on a lower level, and is not movable, forming, in fact, the edge of the bed into which the countries are fitted. The bed itself forms no part of the map any more than does the material of an ordinary map. The best of these maps are made at the Perkins Institute and at the American Printing House. Of course, these maps are expensive, and are suitable for school work only. If in later life a blind person wishes to study geography, possibly the best way is to have the outlines of an ordinary printed map followed with thread, or by the sewing machine. In all relief maps on paper, the physical features are necessarily very indistinct, and cardboard maps are little better, but even such maps are infinitely more useful than none at all.

GLOBES.—Many kinds of globes have been made for the instruction of the blind, to whom they are of the same use as they are to the sighted. They give an idea of the earth's motions and the relative position of continents to each other.

OBJECT LESSONS.—Under this head I include all those studies in which the aim is to make known to the blind the names of common objects and their uses. This work must be begun in the kindergarten and be continued throughout the whole course of education. The work done in blind kindergarten classes differs but little from that done in ordinary classes. As knowledge is obtained through the limited range of the sense of touch, there is necessarily more individual instruction. The blind should be made familiar with the use of all sorts of tools, for upon the dexterity of the hand depends not only their entire education, but also their success in after life. The Sloyd system should, therefore, form a part of the regular course in every institution for the education of the blind, and a few remarks about it may not be out of place. I may say here, before speaking of Sloyd, that though in general there should be no difference between the aims of the education of the blind and those of the sighted, yet the methods in the former should be of the very best and adapted to suit the altered conditions of the pupils.

SLOYD.—The educational value of manual training in general, and of Sloyd in particular, is becoming more and more appreciated, both in the Old World and in the New. Both the Century Dictionary and Funk & Wagnall err in saying that Sloyd originated in Sweden. It, no doubt, was given its name and scientific form in that country, yet it is the gift of Finland to the world. Uno Cygænus, a disciple of Froebel, was the inventor of Sloyd as a factor in

pedagogy. Sloyd (Sloyd Sw. Slojd. skill, dexterity, especially mechanical skill and manufacture) is, as its name implies, a kind of manual training. In Finland it forms a part of the National School work, and embraces working in wood, iron, cardboard, pine strips, canvas, cloth and worsted. In Sweden wood Sloyd is chiefly taught. In England and America, national educators are becoming alive to the immense advantages of this system. If knowledge of the use of tools and the training of the hand is regarded as important to sighted children, how much more important must it be to the blind? At the Perkins Institute, Boston, Sloyd has been regularly taught for several years, and the results have been very satisfactory. The course begins with Sloyd in knitting and sewing, and ends with wood. Several other institutes have made some moves in this direction, but none have placed Sloyd on a scientific basis as the Massachussetts Institute has. Sloyd is yet in its infancy, and is but a further application of the natural methods and principles of Froebel. It recognizes the fact that true education consists of skill as well as of science, of action as well as of reflection.

In all object lessons the principle involved is that, as the blind do not see things they must get hold of them. In this way, every reading lesson becomes a writing lesson, a history, geography and language lesson, for in reading about such a subject as the apple, its growth and genus, its forms and varieties, its history and where it is grown, are all involved. Sloyd, too, comes in, for in the best schools the pupils

are required to make models in clay of the objects studied. The lesson is not considered finished until the subject has been talked about, written about, examined, modelled and read about. Manual training of this kind is so essential to the blind that it is almost impossible to educate them without it.

In object lessons, models of buildings, locomotives, ships and cars, and other common things should be put in the hands of the blind. This can be done at a very small cost, and assists them to form ideas of what the sighted see. It is impossible for them to get ideas of public buildings and churches in any other way. I do not advise the models because of the pleasure which they would undoubtedly give, but because it would keep them more like the sighted, a consideration which I contend should never be forgotten.

CHAPTER X.

HIGHER EDUCATION.

INTO the question whether or not true education is attainable through an educational system, it is no part of my business to inquire. The fact is that in America education is valued, not so much for itself as for it earning power. The mass of the American students are reading the course with the view that a degree will make their work entitled to a higher remuneration. Theoretically the aim of the university is to teach how to study, but 'practically it qualifies its students for some professional vocation. As I am not writing a treatise on education, but simply trying to show how the education of the blind should and can be made like that of the sighted, I shall call higher education that standard of excellence required of the students in the High schools, collegiate institutes and universities. Our task, therefore, will be to investigate how the blind may successfully prosecute study in classics, mathematics, mental and moral philosophy, political economy, physical and natural science, history, English and modern languages. From works on these subjects is selected the course of reading required for the degree of B.A. Most universities have other faculties, such as theology, law, medicine, dentistry, music, etc., but as these are

distinctively technical, I shall consider them under the head of employment.

CLASSICS.—From an academic point of view, Latin and Greek are the only classics of which most students are expected to know anything, and the study of these subjects present few difficulties peculiar to the blind. Lack of the proper text-books is the chief trouble. The actual text is not very voluminous as a rule, and may be easily copied out by hand. The notes and other additional matter usually published with this text, however, are too lengthy to be transcribed in this way. The limited number of text-books required for the use of the blind rendered it very expensive to obtain such books formerly, but the stereo-machine has made it possible to secure any required text-book for a reasonable figure. Dictionaries, however, if published, would be so bulky as to be of little use. After the pupil has been well drilled in grammar and prose composition, probably the best method to follow is to use free translations. The training in grammar and composition will prevent the student regarding the translation as literal, and at the same time enable him to dispense with a dictionary. This plan also constitutes a good language lesson. A well-chosen vocabulary, nevertheless, should be within his reach. The bare text of a few classics have already been published in raised letters, both in England and in the American Printing House.

MATHEMATICS.—How far the blind may successfully prosecute the study has already been made evident in my sketch of the career of Nicholas Saunderson,

the blind professor of mathematics of Cambridge. Saunderson, though the most eminent, does not stand alone; there are many others. Only a few years ago a graduate of the Worcester College for the Blind Sons of Gentlemen won a place among the senior optimes of Cambridge Ordinarily geometry, algebra and trigonometry are the only branches of mathematics required. I shall now show how the blind fare in these studies.

GEOMETRY.—The text of geometry is so much condensed that its transcription forms but a small part of the work of mastering the subject. In a few hours enough of euclid may be copied out to last the student for months. The chief difficulty is the construction of diagrams. This may be done in a variety of ways, by pins and strings on cushions, by Vitali's ink, and by the sewing machine. For beginners the first two methods are best adapted, but in complex diagrams the last is the most suitable. Many blind persons grasp the notion of space so clearly and definitely that they are able to dispense with diagrams altogether. They carry the construction of the figure in the mind's eye, as it were, nor is this done from necessity, for the most complicated diagrams can be made by the sewing machine, the details of which can readily be followed by the finger. By means of the point slate these diagrams may be lettered, so that the blind can obtain diagrams as full and complete as those used by the sighted.

ALGEBRA.—Algebra is a much harder subject for the blind to master than euclid. In the beginning

of algebra they find no great inconvenience, but when surds, indices and work in brackets, fractions and quadratics come on the scene, they have no adequate machinery for setting down the data of the problem. All the possible combinations of the six points fail to supply symbols enough for the varied and numerous modes of algebraic expression. The great amount of space covered by a single example, in bracketing for instance, and the limited range of the dermal sense in the fingers combine to baffle the blind in solving the question. The Hall-Braille writer, by printing on the upper surface, has removed one of the great difficulties in the way of the blind studying algebra. A number of carefully chosen signs will remove another. Such a code has been recently prepared by Mr. Bevins, of the Pennsylvania Institute, assisted by two blind graduates of the University of Pennsylvania. This code, if found satisfactory, should be universally adopted.

TRIGONOMETRY.—This science has in it so much that is of the nature of geometry that the blind do well in studying it. Similar precautions must be taken to guard against confusion of signs in trigonometry as in algebra, neither should the same sign have one significance in the one, and another in the other. The text of trigonometry is condensed like that of euclid, and like it may be easily copied out and the diagrams similarly made.

Mathematical tables may be constructed by piecing together, on a stiff cardboard, sheets of paper on which sections of the table have been written, so that

the lines are continuous, both vertically and horizontally. Small logarithmic tables, and tables giving the sines, cosines, tangents, etc., of angles may be produced in this way. I have some such which I had constructed for my own use, and they answer very well.

PHILOSOPHY.—The blind are very fond of this study, and they are capable of advancing in it as far as their mental ability will carry them. The only difficulty is that of procuring text-books. As in a primary course these are not numerous, they may be transcribed. In more advanced work the student had better transcribe the chief text and make analyses of the others; *e.g.*, in the history of philosophy, a work like Schwegler's "Handbook of the History of Philosophy" must be copied out, as every line of it is important, and in some cases facts are noticed in it that are overlooked in larger works. Zeler's "Sketch of Greek Philosophy," on the other hand, need only be read out to the student, who, as he listens, may stop to note down the more striking and peculiar parts of the book.

POLITICAL ECONOMY.—This science is of comparatively recent origin, and as yet its principles are fluctuating. The question of text-books again rears its ugly head. The plan suggested for philosophy will not answer here, as each author gives to the subject a different treatment. Probably the best way is to make analyses of all the books required, and, as the reading is not so very hard, this may be done rapidly. The more important chapters, such as those on land, labour, capital, rent, wages, profits,

etc., had better be transcribed in full. The chapters dealing with the disputed points require only to be noted.

PHYSICAL SCIENCE.—Under this head I shall deal with physics and chemistry only. Geology, mineralogy and applied science are all studied by the blind with some success, yet, as it is possible to dispense with them in a collegiate course, I shall omit them. The text-books are not voluminous and are easily obtained.

PHYSICS.—The book work in connection with the study of physics is not extensive, and is, therefore, not too lengthy to transcribe. The chief obstacle is the practical work, so it has always been thought. This obstacle has been overcome in such a variety of ways that it has ceased to be an obstacle at all. In some of the American institutions for the blind, Ohio in particular, the pupils have been taught to perform many experiments themselves. Electrical appliances, it may be thought, are not the safest kind of toys to be put in the hands of the blind; yet in these institutions this has been done with comparatively as few accidents as in schools for the sighted. One fact, motion lies at the root of all the laws of heat, sound, light and electricity, and when this fact has been grasped, progress in this science is made easy. Of course, the microscopic work must be taken on trust. It may be thought strange that a child blinded in infancy could know anything about light, and yet Saunderson understood the laws of light as well as anyone, a single ray of which he had no recollection of ever having seen.

CHEMISTRY.—This science is so similar to physics in its methods and subject matter that it hardly needs special notice. I must say, however, that the symbols of the science should be fixed in the embossed copy just as they are in the ink-printed text. All experiments may be performed by the blind except those depending absolutely on the eye and the microscope, which must not be attempted, and the results of which must be taken on trust by the blind student.

NATURAL SCIENCE.—Natural science, or biology, has, like physical science, a very wide range. Botany and zoölogy divide into almost as many distinct sciences as there are varieties of animal and vegetable life. I shall notice only botany, zoölogy and physiology. The methods employed in teaching natural science to the blind are only a more complete series of object lessons than that used in teaching it to the sighted. The blind require to have specimens—stuffed, modelled and alive—put in their hands, that is all.

BOTANY.—Botany is a science peculiarly open to investigation by the blind. To begin with, its nomenclature and terminology are fuller and more definite than those of any other science. Not only has every plant its own name, but every known form of each part has a term descriptive of that form. A good memory enables the blind to retain the various names and terms of the science with their exact significance. Many of the finer differentiations, it is true, depend upon the eye, either naked or aided by the microscope: but these differentiations may be enlarged and modelled in clay, or where this is impossible they may

be, when described in the terms of the science, remembered and associated with the differences appreciable by touch. In the higher forms of plant life tangible differences are well defined, and even in the lower forms many such differences exist.

ZOÖLOGY.—This science has not as yet been so thoroughly classified as botany, though, as the differences in animal life are more sensible to touch, it can be studied with as great, if not greater, facility. As we ascend in the scale of animal life, it becomes more and more easy for the blind to obtain ideas of animals. Those microscopic animals which form the lowest class can only be known to them from description, as models are of little use. Sponges, corals, star-fish, worms, moluscs, lobsters and insects may be all more or less definitely made out by touch; but the vertebrate animals are far easier to determine. Fish, reptiles, birds and the different orders of mammalia may be mastered thoroughly by the blind. When a blind man became the authority of his day on bees, I need say no more of the ability of the blind to succeed in zoölogy. Stuffed birds, snakes, bears and monkeys are easily obtainable. Models may be made, and the more docile of the domestic animals examined alive. All this combines to make zoölogy a very interesting and instructive study for the blind.

PHYSIOLOGY.—Structure and function of the human body have ever been interesting to man, and it loses none of its attractions when the student is physically defective. In physiology the methods employed in botany and zoölogy need only be applied by the man

himself to himself. The skeleton and models of the brain, heart, lungs, and other perishable parts of the human organism, together form the basis for the object lessons of this science. A knowledge of one's own body and what is good for it, and what not, is of great importance to every one. It is vastly more important to those who have any physical weakness, and therefore no good school for the blind should be without a good teacher of physiology, and the best facilities for teaching it.

History and English are to be studied in higher education by the same method as in primary. The only changes necessary are those resulting from the more advanced stage in the student's growth.

MODERN LANGUAGES.—There are a great many modern languages, but those with which most students have to do are French and German, and now and then a little Italian. The blind find no difficulty in learning modern languages, but text-books are difficult to obtain. Unlike Latin and Greek, French and German texts are very lengthy. Probably the best way of studying these languages is by transcribing a portion of the text and using small vocabularies. Translations are as long as the texts, and comparatively useless.

CHAPTER XI.

SPECIAL SCHOOLS FOR THE BLIND.

SCHOOLS for the blind are very numerous, both in the Old World and the New. The purposes of these schools are various; some being for children, others for youths, and yet others for the teaching of some trade. Most of them, however, are for all of these purposes. A list of the institutions for the blind, and a brief account of each would fill a volume. I can notice only a few of the best and most efficient. Nor is it necessary for me to do more, since I hold that these institutions are, on the whole, doing good work. It is not upon the improvement of the schools that the amelioration of the blind depends, but upon the formation of associations of the intelligent blind themselves. Without this co-operation the institutions can accomplish little. The schools in England, previous to the formation of the British and Foreign Blind Association, were practically asylums, and since its organization they have become educational institutions. Although the majority of the institutions in America are not asylums, yet I think that the increasing of their usefulness depends chiefly upon their intelligent graduates. These American schools are as efficient as the sighted can make them for us, and we must do the rest ourselves.

THE PARIS SCHOOL.—"L'Institut des Jeunes Aveugles," founded by Haüy, in 1784, is the oldest and perhaps the best school for the blind in the world. Its aim is to give to its pupils a thorough literary and musical education. It was the first school to recognize the fact that the blind are the persons best able to deal with their own difficulties, and, consequently, it was the first to make a success of their education. All the teachers are blind. This is, perhaps, carrying the principle too far, and would, I think, have a tendency to isolate the blind. A staff having the heads of departments blind and the assistants sighted, would be more suitable. The Paris school, however, has an enviable record. About 60 per cent. of its graduates have succeeded in maintaining themselves in after life. No higher praise can be given to it than to point to this great success of its ex-pupils. The history of the Paris School has been one long series of the triumphs of genius over blindness. The Braille system, the Braille musical notation, music as a profession for the blind, and piano-tuning as a vocation for them, all had their origin within its walls. In fact, only one great advance in the education of the blind has been made out of France. The last epoch-making invention in this direction is the stereotype-maker and American appliance.

THE ROYAL NORMAL COLLEGE.—"The Royal Normal College and Academy of Music for the Blind," Upper Norwood, London, was founded in 1871. Its aims are similar to those of Paris, and its reputation, as a school, is almost as great. It has a peculiar

interest for us, arising from the fact that the founding of this great institution was almost altogether due to the efforts of the British and Foreign Blind Association. The importance of this origin is, that it gives practical expression to what I have called the great condition of success in educating the blind. Here the blind found an institution, chose a gifted blind man as its head, and in less than fifteen years after its establishment the wisdom of their action is proven. Prior to its opening the number of successful graduates in England was about one-half of 1 per cent. In 1885, 80 per cent. of the graduates of the Royal Normal were estimated to be self-sustaining. Mr. F. J. Campbell, who for thirteen years had been a music teacher in the Perkins Institution, Boston, and who had made that school the best school of music for the blind in America, has been the Principal of the Royal Normal ever since its foundation, and it is to him chiefly that it owes its success.

WORCESTER COLLEGE FOR THE BLIND SONS OF GENTLEMEN.—This institution, as its name implies, has for its object the giving of a collegiate training to the blind sons of gentlemen. It prepares its students for university work and for entering the professional studies. It was begun in 1867, though it was not established permanently until two years later. Its peculiarity is its coeducation of the blind and sighted. This plan is found very satisfactory. The only other institution, so far as I am aware, which follows this idea is the Iowa College for the Blind, Vinton, Iowa. In a paper read before the twelfth biennial meeting of

the "American Association of the Instructors of the Blind," held at Brantford, Ontario, in 1892, Supt. T. F. McCune, of the Iowa College, shows how great the advantages of this plan are to the blind. He points out, however, that the sighted gain nothing by it and loose much. It seems to me that great care is needed to make the scheme beneficial to both classes. There are thousands of sighted persons who have none of the advantages which a special school has to offer, and who are exposed to worse evils than are inherent in its life. Some of these people might, it seems to me, be taken into the special schools without any injustice to themselves and with profit both to the State and to the blind. Superintendent McCune's conclusions are based on many years' experience, and the plan has long been in operation at Worcester, and when we think that the two schools differ in almost every other particular, their success and their commendation of the plan should be carefully considered by those who are at the head of institutions.

There are many other excellent schools, both in the United Kingdom and on the Continent, but I have no space even to name them in this work. An account of the most important not mentioned here will be found in the Chapter on Trades.

AMERICAN INSTITUTIONS.—There are two kinds of institutions for the blind in America—corporate schools and State schools. Though this difference is simply one of constitution and management, it is far reaching in its consequences. The corporate schools were founded by private organization, while the State

schools were instituted by the State. In the one case the appointment of officials is in the hands of corporations, in the other it is controlled by the Government. The success of a school depends altogether upon its management, and the heads of these schools are, as a rule, highly-paid officials. A corporation is composed for the most part of persons who are deeply interested in the welfare of the blind, and who will therefore chose its officers with this idea in view. State governments, on the other hand, are creatures of the parties, and the superintendence of State institutions is regarded as legitimate party plunder. To the victors belong the spoils, is the spirit which governs appointments in the majority of cases. One of two evils often results from this way of looking at the management of institutions. A Government with a long lease of power may continue in office an incompetent superintendent, or a change of Government may deprive an institution of its faithful head. The corporate schools are not subject to drawbacks of this kind, and to the best of my knowledge none of them have ever been under an incompetent management. In the brief notes which follow, ample proof of what I have said will be found.

The American institutions are in no sense asylums. They aim at giving to the blind a general education and some technical training. The standard of this education varies from our entrance to our matriculation requirements. In the majority of cases the standard is much nearer the former that the latter. The course of study generally includes a literary depart-

ment, a kindergarten, a musical department, and departments of manual training, physical culture, and of handicraft. This description applies to the majority of the schools. Each one, however, has its differentia, and some of the more remarkable schools' peculiarities I shall now take up.

CORPORATE SCHOOLS.—There are not many of this class in America, and three of these, beyond all doubt and question, have been, and are yet, among the best managed schools for the blind in the world. Though they are not State controlled they are State endowed. In this way all the advantages of State schools are secured without any of their drawbacks.

BOSTON.—The Perkins Institute and Massachusetts School for the Blind was founded in 1829. It aims at giving a thorough general education and technical training in music and piano-tuning. It consists of three separate departments. The parent school at South Boston, the kindergarten at Jamaica Plains, and a workshop for adults. All these departments are well managed. Its music culture is the best of its kind in America. Its situation in a great musical centre is the chief cause of this, and the fact that its head has generally been blind is another. The school's differentia is the attention paid to the social side of the life of the blind, an aspect of their education too often neglected. Its present head is Mr. M. Anagnos, a gifted and distinguished educator, whose efforts introduced Sloyd into American institutes for the blind. Mr. Anagnos succeeded his father-in-law, Dr. Samuel G. Howe, a man who will never be forgotten

by the blind, for whom he did so much. Mr. Anagnos' reports are full of interesting and valuable information, and the style in which these are written indicate faithfully the character of the man. The pleasing and happy way of putting things renders report-reading, usually so tiresome, positively enjoyable. In fact, Mr. Anagnos' reports are among the most interesting and instructive works on the education of the blind which it has been my fortune to meet.

NEW YORK.—The New York School for the Blind was founded in New York in 1831. It was one of the first schools, or rather its Principal, Mr. William B. Wait, was one of the first men to recognize the fact that the blind cannot succeed as manual labourers. Mr. Wait has been for thirty-five years superintendent. I have already noticed his work in arranging and promoting the New York Point and I shall treat of his ideas on employment in the proper place Mr. Wait's ideas are practical, and he always has an eye for the main chance. The musical instruction is hardly less efficient than that of Boston. The standard of education is that of the New York State University. In this we see again the practical turn of the superintendent's mind. The pupils have the examination papers dictated to them, and their answers they write out by the type-writer and send to the Board of Regents for examination. It is obvious that if the blind are to engage in the educational and professional work of the world the best thing they can do is to conform to the requirements of that life. The immense practical advantage of such a course is also quite obvious.

PHILADELPHIA.—The Pennsylvania Institute for the Instruction of the Blind was founded in 1833. Its music and handicraft departments are considerably above the average. But it is in education that this school may fairly claim pre-eminence. Its staff recognizes more than that of most other schools, whether special or ordinary, the inner connection and correlation of the different branches of education. The course of study is most thoroughly, systematically and uniformly developed. In 1893 two blind students graduated in the Arts department of the University of Pennsylvania. The expense of educating these students was borne by the institution. This is a practical recognition of the principle for which I have been contending, and a fact which shows at the same time the high appreciation of the value of education to the blind by the school authorities. Its principal is Mr. E. E. Allen, a gentleman who has had considerable experience as an educator of the blind. He was formerly librarian of the Royal Normal, and later a teacher in the Perkins Institute. It is to his efforts that the Pennsylvania Institute owes its place among the foremost educational institutions in America.

BALTIMORE.—Another corporate school of high rank among special institutions for the blind is the Maryland School for the Blind, incorporated by the General Assembly of Maryland in 1853. The blind of the District of Columbia are also educated here. Its able superintendent for many years has been, and is yet, Mr. F. D. Morrison. Its special feature is the employ-

ment of some of its workshop graduates who fail to succeed by themselves. Its general appointments are good. There is also a separate department for coloured blind, as in most of the Southern schools. It is also significant that the best American institution for the blind founded in the last ten years is a corporate school in (West. Penn.) Pittsburg, Pa., incorporated 1887.

STATE SCHOOLS.—The majority of the American institutions are in this class. Each has some merit, though those connected with schools for the deaf are much less efficient than the institutions for the blind only. A few of the best may be mentioned here. A full list will be found in the last chapter,

ST. LOUIS.—The Missouri School for the Blind was founded in 1851 and was, it is claimed, though this is disputed by Mr. Wait, the first institution in the world outside of Paris to recognize the superiority of a point system over a line, and which was introduced there in 1860. Its management has ever been ready to adopt the most improved methods and appliances used in educational work. The Braille-writer and the stereotype-maker were no sooner shown to be practical than they were introduced here. Phonographs are used to dictate to the pupils. This fact is alone sufficient to show the progressive tendency of the school. I believe that nowhere else is such a novel and practical use made of this instrument. Its present superintendent is J. T. Sibley, A.M., M.D. He was one of the committee who settled the form of American Braille, his colleagues

being J. W. Smith, its devisor, and Principal Allen, of Philadelphia. He also designed the pocket-tablet, so extensively used in the United States for writing Braille. Scientific massage has been lately introduced into this school, but of this further on.

LOUISVILLE.—The Kentucky Institute for the Education of the Blind was founded in 1842. It owes its prominence to the fact that the American Printing House is a consequence of its existence. These institutions are situated on the same grounds and are under one superintendent, Mr. B. B. Huntoon, who, for many years, has been among the foremost advocates of the cause of the blind. The school itself is built after the plan of the Indiana institute, which was designed by its blind superintendent, Mr. W. H. Churchman, and this thought brings us naturally to—

INDIANAPOLIS. — The Indiana Institute for the Education of the Blind was founded in 1847. Its past history affords a case in illustration of the dismissal of a competent officer for political reasons. Mr. W. H. Churchman, the founder, a most capable superintendent, was removed to make room for a person who had done good service to the successful party. This was a great loss to the institution, and it took years for it to recover from it.

JACKSONVILLE.—The Illinois Institution for the Education of the Blind was founded in 1849, through the efforts of Samuel Bacon. Bacon was a graduate of the Ohio Institute for the Blind. He succeeded in inducing the Legislature of Illinois to

provide for the education of his fellows, and in 1849 an institution was opened at Jacksonville, with him as its head. At the end of his first year he disagreed with the management, resigned, and went farther west to found another institution. The Iowa College and the Nebraska Institute owe their origin to the energy of this active missionary. Dr. Frank H. Hall, the inventor of the Braille-writer, and the stereotype-maker, was superintendent of this institution from 1890 to 1893. For twenty-five years Dr. Hall had been a superintendent of the Public schools of Illinois, and after his dismissal, which was one of the consequences of the democratic victory in 1892, he returned to this work, and is now superintendent of the Public schools of Waukegan, Illinois. He was succeeded by Rev. W. F. Short, D.D. The new superintendent has not yet been in office long enough to show what manner of man he is. But the folly of dismissing a man like Dr. Hall cannot be too strongly condemned, for in the three years of his tenure of office he had done more towards the amelioration of the blind than any educator since the days of Braille. Wallace P. Day, who was for three years head of the music department in the Ontario Institute, has been since 1886 in a similar position in Illinois Institute. Those who have any knowledge of Mr. Day's work at Brantford will know from this fact that the musical department of the school in Illinois is among the best in America.

Other institutions entitled to place among the first-class State schools for the blind are Georgia, Iowa, Kansas, Michigan, Minnesota, New York State, Neb-

raska, Ohio, Tennessee, Texas and Wisconsin. Most of the other States and some of the territories provide for the education of their blind, but either the institutions are in their infancy or connected with schools for the deaf. When the blind and deaf are placed under one management, the blind are generally the losers; as it is so much easier to overcome the difficulties of the deaf, the blind receive less attention. An examination of the reports of these institutions will bear this out. The chief drawback to these State schools is, as I have said, that their superintendence is regarded as party plunder. Without permanent and competent officers no school can succeed, and by this method of appointment these are very hard to obtain. I am of the opinion that we will have to wait until a better class of men arise before such appointments will cease to be regarded as fair game, and that at present the State would consult more the interests of the blind whom it wishes to benefit by endowing and not controlling institutions. The New York State school has had three different superintendents in as many years. Ohio and Wisconsin have had similar experiences, and all the State schools are subject to similar disturbances. I do not say that incompetent men have been or are certain to be appointed, but the education of the blind is peculiar, and its needs cannot be understood in the twinkling of an eye. To master it thoroughly requires years of patient study and research, and so long as the head of an institution knows that his tenure of office expires with the Government that appoints him, he will not be so

likely to take time to investigate, and moreover he is likely to give some of his time to the service of the party that gave to him his position.

CANADIAN SCHOOLS.—The total number of institutions for the blind in Canada is four. Of these two are in Montreal, and are not of much account. The other two are the Ontario Institute, at Brantford, and the Halifax School.

BRANTFORD.—The Ontario Institute for the Education of the Blind was founded in 1872. Before speaking of this venerable and valuable institution, I may say that I speak from experience. I was a pupil there for seven years, from 1883 to 1890. In my account of other institutions I have had to rely altogether upon their reports, and what I have said is based upon information contained therein. For the past fourteen years the institution has been under the able superintendence of Mr. A. H. Dymond, a good manager and a strict disciplinarian. As an institute, as far as one can judge from reports, the Ontario Institute is, if anything, a little above the average of American State schools. The Principal, though reserving to himself a veto in all cases, leaves the conduct of departments pretty much in the hands of their senior officers. Of the music and handicraft departments I shall treat in the chapters on employment. Of the kindergarten and department of physical culture I have nothing to say, except that I believe them to be quite up to the average now. The gymnasium has been built since my time, and the kindergarten was only in its infancy when I left, so that I have no personal knowledge of their work.

Of the literary department, a few words will suffice. The work in this department is as thorough as the present condition of the blind justifies. The instruction is nearly all oral, and the pupils are orally examined. Such practices have long been condemned and abandoned by the best schools for the blind, and I have little doubt that they will soon be discontinued here. An interesting illustration I have in mind of the weakness of this system. In an English history class the teacher stated that Disraeli died in 1871. One of the pupils, an English immigrant, said that when he was in Birmingham, in 1876, he heard him speak. The teacher replied that there might have been a special resurrection for his benefit at that time, but that Disraeli died in 1871. Now, as a matter of fact, the most important period of Disraeli's public life was from 1874 to 1880, and he did not die till 1881. The teacher had made a mistake in making the note, that was all. The necessity of the use of text-books and of independent reading by the pupils could hardly be more forcibly illustrated. Nevertheless, history, geography and the history of English literature are well taught here, though arithmetic, English grammar and composition are below the average, taking the entrance standard to High schools in Ontario. The other subjects—reading, writing, physiology, temperance, hygiene and object lessons—are very good.

The chief objection that I have to the school is that it is not in the Education Department of the Province. Its association with prisons and asylums is not only derogatory to its mission, but positively

injurious to its standing in the eyes of the people. This defect should be remedied at once. Persons competent to inspect prisons and asylums often know nothing of the work of such special schools, as the instance noticed further on is in evidence. In his last report, Mr. Dymond makes an admirable defence of the institution, its staff, its expenditure and its usefulness. I must say that in most particulars his points are well taken. I believe that the work of the institution must be supplemented by organizations of the blind themselves, and to this matter I shall presently proceed.

MONTREAL.—Of the two institutions in this city little need be said. The one is the Mackay Institute for Protestant Deaf-Mutes and the Blind, incorporated in 1869. It pays little attention to the blind, there being only three pupils in this department in 1893. The only trade taught is piano-tuning. Its present Superintendent is Mrs. Harriet E. Ashcroft. The other was founded by the Grey Nuns in 1872, and is still managed by them. The trades taught are chair-caning, music and tuning. The pupil population is mostly French, and French is the language of the school.

HALIFAX.—The Halifax School for the Blind was incorporated in 1869. It has many elements in its constitution and management that insure its success. It is a corporate school, endowed by the Legislatures of the four Maritime Provinces—Nova Scotia, New Brunswick, Prince Edward Island and Newfoundland. Its present superintendent and many of its teachers are blind. It is situated at the centre of culture

and art in these Provinces. In its education the Sloyd system and the Braille characters, together with the recent machines for producing them, are used. It has organizations connected with it for increasing the library and for giving assistance to the blind without its walls. Its tuning and music and physical culture departments are of the best. All these elements combine to make the Halifax School one of the best and most efficient on this continent. Willow basket-making and chair-caning are the trades taught. A new departure in the department of handicraft has been taken lately. Mr. S. Harrivel, a graduate of the school, has for several years been a successful manufacturer of telephones, electric bells and many ingenious devices, and has constructed dynamos, friction batteries and other appliances. Mr. Harrivel, believing that what he can do other blind persons can accomplish, has begun to train the pupils of his *alma mater* to set up and repair telephones, to manufacture and put in electric bells, and to find like work in the ever-widening field of electricity. The development of this experiment will everywhere be eagerly looked for by all those interested in the employment of the blind. The other distinctive feature of this school is its establishing of a home-teaching fund, by means of which the school is enabled to send a teacher to the aged and infirm blind and to those not eligible for school instruction. The present Superintendent, Mr. C. F. Fraser, deserves great credit for his efforts towards this great achievement.

CHAPTER XII.

HOME-TEACHING SOCIETIES AND ASSOCIATIONS OF THE BLIND.

THE value of association is of great importance to every class. To the blind its importance can hardly be over-estimated. There are quite a number both of associations for the blind and of societies of the blind themselves. It is to be regretted that the latter class are not more numerous. I believe that upon the formation of such associations the solution of the great industrial problems now perplexing the blind depends. It will be my duty, therefore, to explain how the organizations would affect the question. Before doing so I must say something about the associations for the blind.

HOME-TEACHING SOCIETIES.—These societies are almost peculiar to the Old World, and deal with an aspect of the condition of the blind generally ignored in America. They visit the aged and infirm blind, cheer and encourage the successful graduates of the special schools, and endeavor to find profitable employment for those who are unable to maintain themselves by the trade taught them there. They teach those who become blind late in life to read and write, and suggest to them means of supporting themselves. Finally, they assist some to tide over times of tempor-

ary distress; start others in business, whom it is thought will become self-sustaining later on. There are more than eighty of the home-teaching societies in the United Kingdom. Almost all of the large cities have each one or more, but in most cases these are merely agencies for propagating Moon's system. Among the most important of the home-teaching societies are: "The Indigent Blind Visiting Society," of London, founded 1834, and "The Glasgow Home-Teaching Society." The former is the great missionary society to the blind of London, of whom it visits upwards of a thousand. The latter takes care of the out-door blind of Glasgow and the surrounding parts of the County of Lanark, of whom it visits more than five hundred.

Besides home-teaching societies there are in Great Britain a large number of other charitable organizations, with diverse objects, and of which the most important are those corporations sustained by charitable associations, and maintaining the special schools, and mostly in connection with the Established Church. So far as I am aware the only home-teaching societies out of Europe are the one in Halifax, already mentioned, and those of Brisbane, Sydney and Adelaide, Australia.

THE AMERICAN ASSOCIATION OF INSTRUCTORS OF THE BLIND.—The only important association for the blind of the New World is the American Association of Instructors of the Blind. It is continental in its extension, and chiefly educational in its aims. No one can read the reports of this association without

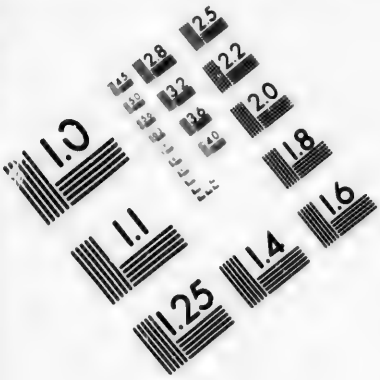
being convinced that the American instructors of the blind are earnestly trying to solve the perplexing difficulties confronting their charges. The association is composed of the heads and one teacher delegate from each of the institutions in North America; and has for its object the discussion of all questions relating to the work and management of special schools. At the biennial meetings papers upon leading questions are read and discussed. A considerable number of blind members in the association prevent its deliberations from going astray, and the sighted members supply the normal elements. It seems to me that the great mistake made is to allow the opinion of the sighted members to have weight in discussing such a matter as the relative tangibility of raised letters. Nevertheless this association does a great work. It serves to remove those prejudices which a narrow field and limited knowledge necessarily create. The following programme of the thirteenth biennial meeting will illustrate the importance and variety of the subjects discussed:

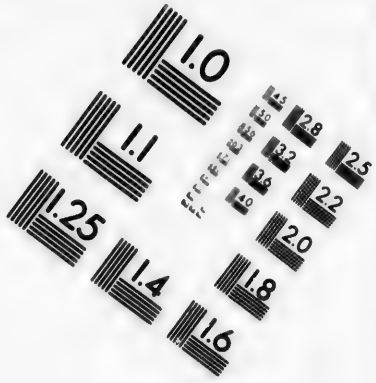
PROGRAMME OF THE THIRTEENTH BIENNIAL MEETING OF THE AMERICAN ASSOCIATION OF INSTRUCTORS OF THE BLIND, HELD AT CHAUTAUQUA, 1894.

Address of the President, A. H. Dymond, Principal Ontario Institute.

"Suggestions for Studies in Psychology," by James J. Dow, Superintendent Minnesota Institute.

"The Use of Text-books," by G. Morrison, Baltimore Institute.





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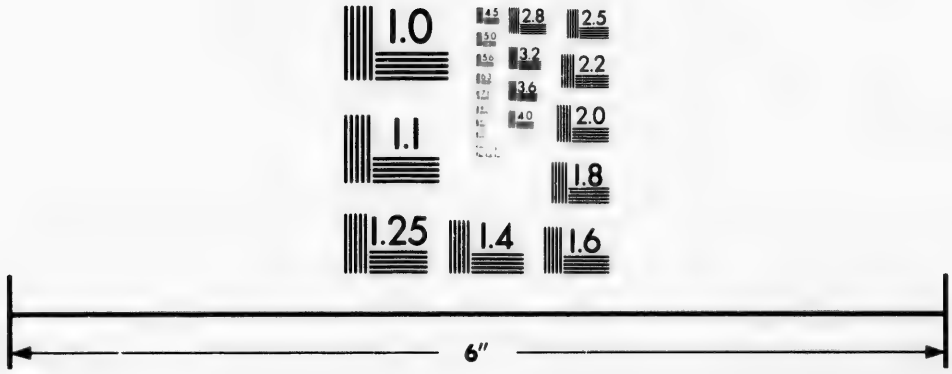

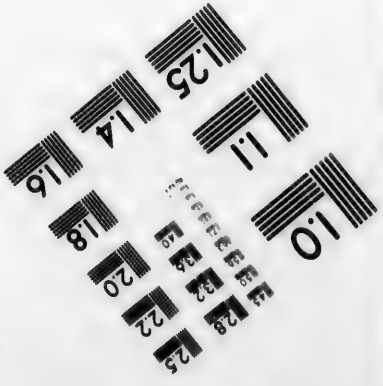

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"The Physical Development of the Blind," by H. N. Felkel, Florida Institute.

"System *vs.* Individuality in the Education of the Blind, in both Local and National Preference," by W. G. Todd, Kansas Institute.

"How can we give our Pupils a More General Knowlege of Business?" by J. M. Costner, North Carolina Institute.

"Methods of Discipline," by T. F. McCune, Iowa College.

"Primary Reading," by Miss Nellie Love, Indiana Institute.

"Are we Working on the Right Line," by H. B. Jacobs, West Pennsylvania.

"State Homes for the Blind," by F. R. Place, New York Institute.

These meetings of the Association of Instructors derive most of their importance from the fact that the trustees of the American Printing House avail themselves of the opportunity afforded to hold their own meetings at the same time. The superintendents of the institutes of the United States are *ex-officio* trustees of the Printing House. The American Association of Instructors of the Blind passed a resolution in convention at Indinapolis recommending that the New York Point System should be taught in all institutions for the education of the blind. (1871.) During the seventh biennial convention of the Association at Janesville, Wis., in 1882, the trustees of the Printing House decided that 50 per cent. of the whole revenue arising from the Congressional grant should

be expended in publishing books in the New York point. In July, 1892, at Brantford, Canada, during the twelfth convention of the association, it was decided by the trustees of the Printing House to expend the whole amount of money arising from the Congressional subsidy in publishing books in the New York Point. This last fact makes the convention at Brantford, historically, one of the most important meetings that the association has ever held.

Among other associations for the blind, whose work is specially deserving of mention, is the Society for Providing Evangelical Religious Literature for the Blind," Philadelphia, H. L. Hall, general agent. Through the efforts of this society a large number of religious books have been put within the reach of the blind.

ASSOCIATIONS OF THE BLIND.—The greatest, and, in fact, the only, considerable organization is the British and Foreign Blind Association. The best way of showing the practical value of association to the blind is to give some account of the work and achievements of this great society, and to point out what has been accomplished by less pretentious associations.

THE BRITISH AND FOREIGN BLIND ASSOCIATION. —In 1868, a number of blind gentlemen in England being struck with the vast superiority of the blind of France to those of their own country, determined to investigate the matter and, if possible, to improve the condition of their fellows in England. Accordingly in that year they formed themselves into an Association for Promoting the Education and Employment of

the Blind. Their first task was to discover the best form of tangible print. This, after two years, tney declared to be the Braille. All the members of the Council were blind, or so nearly blind that they must depend wholly on the sense of touch in reading, and their opinion was based upon experience derived from extensively reading and writing in all the point systems, for it was soon apparent that the blind were unanimous in condemning the line letters. The next great work undertaken was the founding and up-building of the Royal Normal College, the object of which is to so educate the blind that by superior intelligence they can hold their own against sighted competitors. In fact, so far as I can discover, this association has always aimed at increasing the earning power of the blind by improving their education. The members of its Council believe, as I do, that the blind must work with their brains even in unskilled labour to a greater extent than is required of the sighted. The only way to ameliorate the condition of the blind is to improve their general education. This has been the opinion of the "British and Foreign," and they have given effect to it by making themselves the largest printing house for the blind in the world. Their appliances have always been found to be the most practicable and least expensive made. Their pencil cards, arithmetic boards and maps are in evidence of this. On the whole, then, it may be fairly claimed that the British and Foreign Blind Association has been the most active agent in pro-

moting the education and employment of the blind in the world. I need say no more in regard to the value of association to the blind in general, but proceed to show its advantages in local reference.

ALUMNI ASSOCIATIONS.—The only associations of this kind, of which I am cognizant, are the Alumni Association of the Perkins Institute and Massachussetts School for the Blind, and the Alumni Association of the Indiana Institute for the Education of the Blind. The former is a well-established institution, and its great work is the publication of the *Mentor*, the leading magazine in America, specially devoted to the interests of the blind. The latter was only organized a few years ago, yet its members are well pleased with its results. In 1892, the first reunion of the ex-pupils of the Indiana Institute was held, and, if it served no other end, it showed to the blind of the State that they have great social qualities. Alumni associations are of great value in this and other ways, but I think that greater good results from associations of all the blind in the locality, because individual blind men, who have never attended any special school, often develop methods and appliances which are of great use to all blind persons; and, on the other hand, such persons derive indirectly some of the advantages of the special schools from intercourse with institution graduates. However, the advantages derived from alumni associations are considerable, and the formation of such associations should be encouraged.

THE TORONTO CLUBS AND ONTARIO ASSOCIATION OF THE BLIND.—In the fall of 1891, efforts were made to obtain an organization of the Toronto blind, but it was not until the following year that the Self-Help Club was formed, with Mr. William Stewart barrister, as its president, and myself as its secretary. The object of this association was to promote the employment of the blind, or rather to gather information regarding it, and to apply such as far as we were able. After about a year and a half, in which meetings were held regularly on every second Tuesday in the month, the name of the association was changed and its objects and *personnel* considerably altered. We had accomplished considerable. The most valuable part of our work was an interchange of ideas upon methods of locomotion, education and employment. The results were, our association and its objects were brought before the public by means of reports of our proceedings in the papers and a concert given under our auspices. Some three or four were taught to read the New York Point, and two piano-tuning. Our members received many valuable hints on methods of locomotion, and the attention of the Government was called to the failure of the basket-making industry. But perhaps its most important outcome was:

THE "ASSOCIATED BLIND."—When Mr. Stewart and myself left the city, and Dr. Howie the country, the reins were handed over to President J. K. Cameron and Secretary R. J. Harcourt. In a few weeks the whole club formed itself into a ring of

coal and wood agents. It was found that this business was very profitable, and arrangements were made with Mr. McFarlane and the Dominion Coal Co. to give to its members commissions on orders sent in to them. For a time this arrangement worked well, but later on, owing to difficulties with the coal people and to internal dissentions, the club came to an end, practically, though some of its members still continue to follow this vocation to advantage.

THE "BLIND SELF-HELP CLUB."—Many of those who had been dissatisfied with the Associated Blind and thought that they were benefited by such organizations, formed themselves into the Blind Self-Help Club, with objects similar to those of the old Self-Help Club. I was elected president, and Mr. F. W. Johnston secretary. We have continued to work along the lines of the old club, and I may say that our success has been equally gratifying. We have given another concert, and by an appeal to the Toronto professional men we have raised funds enough to purchase a printing plant. We are only waiting for the stereograph to be perfected in order to begin, and as I have already said, if it does not appear soon we shall have to set up a stereotype-maker and endeavour to change the system, as we think this a less evil than a scarcity of cheap books.

I think that now I have shown how the blind may be better educated. The Government should supply the funds on economic grounds. The institutions give to the blind a good primary education; the associations of the blind would furnish advice and

assistance in the matter of text-books and in methods of overcoming the difficulties connected with a university course, or technical training. I may say here that the blind are willing to help each other; I know from experience, for when I was at college many text-books were copied out by my blind friends for me, and I take this opportunity of thanking them, and of saying that I will volunteer to do the same for any blind persons who are candidates for university honours. The value of association in matters of employment is even greater than in educational work. Several of the members of our associations have been put in the way of making a livelihood as agents by others of them in the business. The Ontario Association of the Blind is merely an extension of the Toronto Club, and we have corresponding members in almost all the cities and large towns of the Province.

PART III.

EMPLOYMENT OF THE BLIND.

CHAPTER XIII.

GENERAL NATURE OF THE PROBLEM.

SO far we have had much reason to rejoice at the results of this investigation into the condition of the blind. We have seen that their very blindness makes possible a more fruitful mental life. We have seen also that blind men have attained to the highest honour and distinction in many branches of literature, philosophy and art. Their education, we have found, need be in no material way impeded by their blindness, and that though few blind men can be said to have been men of the widest scholarship, yet many of them have been men of the deepest learning. Now, however, we are brought face to face with that which makes blindness a misfortune. In a single sentence this cause may be stated: Blindness generally destroys the earning power of its victims. No matter how intelligent or how well educated blind men may be, they find it impossible in the majority of cases to maintain themselves. I am aware that even to those who are familiar with the subject these

statements may seem a little too general in their character, a little too broad. But I speak of the blind as I know them, many of whom are persons of superior intelligence, good education, and very desirous of making their own way in the world; yet most of them fail in their efforts to do so. This greatest of all obstacles in the way of the blind is the chief cause of their unhappiness.

The great problem to be solved, either by or for the blind, is this one of self-maintenance. No satisfactory solution of this problem has yet been found, nor do I claim to have discovered any. I merely suggest an hypothesis which may prove to be the true solution. My idea is to cease training the blind for manual labour, and begin to fit them for mental work. The *a priori* reasons for this change have been noticed already. The hand works more effectively with than without the aid of the eye. The mind's activity is increased by the absence of the visual sensations. In this portion of my book I produce the *a posteriori* evidence in favour of my hypothesis. A brief outline of the various attempts which have been made to overcome this great difficulty for the blind is of course necessary to an adequate understanding of this question. It is very difficult for me to give to this outline any definite shape, because, as yet, no systematic effort has been made to collect the data necessary to it. The best that I can do is to give a short account of the different attempts, without making an effort either to keep them in their chronological order or to show the

relation between them. This part is much shorter than either of the preceding parts, chiefly because there has been so little organized work in this direction. It is true that a ponderous volume might easily be filled with accounts of the ways in which individual blind men have supported themselves, yet in any large number of cases it is hard to find more than the general law exemplified, viz., the increased activity and fertility of the mind. I have selected from the material available a few of the more striking cases to illustrate my view.

The exact position of the blind with reference to employment may be summarized thus: Most of the trades are closed to them altogether, because the eye is absolutely essential to working at them. Of those trades in which the eye can be dispensed with, only one is remunerative—piano-tuning. All commercial service is, for the most part, out of the question. When the blind enter the commercial world it must be at their own risk, and consequently it is an agent's work or small storekeeping which are open to them, and not clerkships. Among the arts—music, architecture and literature remain open professions, while sculpture and painting are lost. Most of the professions are open to some extent. The teaching of certain subjects in some parts of the world; journalism altogether; pharmacy, dentistry, and veterinary surgery to a very limited degree. The pulpit may be entered, except in the Churches of Rome and England; the bar is open altogether, and medicine to a great extent in special subjects.

With reference to these vocations the foregoing statement sets forth the position of the blind generally and applies both to men and to women. A word, however, must be added with regard to the employment of blind women. So far as women desire to enter the employments named they are similarly conditioned by blindness. But in that work which falls more within the sphere of women the triumphs of genius over blindness have been almost complete. Blind women are successfully taught hand and machine sewing and knitting, crocheting and fancy work, baking, cooking, and all those infinitely various occupations which constitute domestic employment. From this point of view blindness need make little difference to the efficiency of women. With regard to their respective spheres it may be said that while the earning power of men is almost destroyed that of women is but slightly impaired. But when the social aspect of life is considered it is obvious that, if blind women are to hold their own with their sighted sisters, they must be very well educated and generally highly developed. This is the first and last time that I take account of difference in sex, except where my remarks evidently apply to men only, they are to be taken as referring to the whole class of blind persons.

This summary would seem to leave a goodly number of vocations open to the blind. There is, however, another aspect of this question. That many vocations remain open is true, but the circumstances of any individual has quite as much, or even more, to do with that individual's entering any particular

vocation. If the foregoing list of callings be examined closely it will be found that those which remain open require a long and expensive course of training before any one of them can be entered. This fact closes the professions to the majority of the blind quite as effectually as inherent difficulties do the trades. As a rule, the blind come from the poorer classes; the measures preventing blindness, or rather those preservative of sight, are less employed by them, and the best medical skill less within their reach. The causes of blindness are more active because the laws of health are more freely disregarded. If my plan is to be adopted either the Government or private philanthropy must take it in hand. At present the Government of Ontario makes a per capita grant sufficient to train the blind for any of these pursuits. This grant is generally about $270 per annum. If this grant were made to an ordinary university man he would be able to defray all the annual expenses connected with his university course, and with some care he might do with considerably less. This includes board as well as tuition. The training of a blind man in one of the best and consequently one of the most expensive colleges in Canada does not cost more than $270 per annum. I know, for I have been there, and my university record shows that my course was no less creditable than that of the majority of my fellow-students. Music and piano-tuning are taught about as well at the Ontario Institute for the Blind as its situation at Brantford allows. One of the chief conditions of a successful school of music for the blind is, according to M. de la Sizeranne, an

eminent French authority, that it must be situated at the great musical centre of the country for which it is intended. This Brantford certainly is not. But of this more hereafter. The Government has simply to carry the principle involved in training the blind in music and tuning one step farther, in order to put my plan into operation. In order to do this of course the more advanced pupils would have to be sent to the place which happens to be the great provincial centre of the particular calling for which such pupils are adapted. In the great majority of cases this would be Toronto for Ontario.

The training both in music and tuning would be greatly improved by their removal to Toronto. The present institution might still be used as a preparatory school. This would involve no additional outlay on the part of the Government, and by it the blind would be benefited to an enormous extent. That the present Government are not likely to do anything of this kind is obvious, from their declarations to make no change whatever. It is to private philanthropy and the efforts of the blind themselves, therefore, that we must look to give effect to this idea. I do not call it my idea, because it belongs quite as much to the other members of the Ontario Associations of the Blind as to myself. It will be time enough to explain the minute details as to how our idea might be put into operation when there are more prospects of obtaining the wherewithal to begin than at present. I mention the existence of our plan simply to make public the lines along which our associations hope to make progress.

I am aware that the problem which I have stated to be the chief perplexity of the blind is the same in principle as that which political economists have been trying to solve for everybody. It is true that for the majority of men the problem of self-maintenance is the one of most absorbing interest. It may be said that the solution of this problem is quite as difficult for the sighted as for the blind. No doubt this is a sad truth, and the greatest blot on our modern civilization, but it seems to me that here there are circumstances which greatly increase the misery of being out of employment, or rather of being without the means of support. When unemployed the blind are almost without the ordinary amusements of life. They can take no part in athletics of out-door life; the pleasures of sight-seeing are denied them; in short, they are shut out from all that infinite detail of social life which is the chief consolation of the unemployed. The unemployed blind man finds far more difficulty in inducing persons to read to him even than does the employed one. But were it not for the great economy of employing the vast mental energy of the blind and not allowing it to waste, it would hardly be my place to plead our cause since, in my work, I do not pretend to be a philanthropist, but an economist. In providing for the development of the blind, I hold that the State is doing its best to make use of its resources, and not performing a charitable act. Of course I recognize the fact that without the co-operation of the blind themselves, and of their friends, all legislation will be in the future, as it has been in the past, for the most part in vain.

CHAPTER XIV.

BRIEF OUTLINE OF THE ATTEMPTS TO EMPLOY THE BLIND AT TRADES.

LOOKED at from a strictly business point of view almost all the attempts to employ the blind at trades have failed. There is, however, another important aspect of these attempts which must be considered. The most successful of them have begun with the recognition of the fact that a charitable supplement was necessary to their fruition. Such attempts are most laudable, and in the absence of any real solution of the problem are the best of all possible ways in which to assist the blind. The less the amount of the charitable supplement the nearer are we to a final solution of our great problem. That plan is most to be commended, therefore, which requires the least charitable support, and at the same time gives the assistance it does in such a way as not to lessen the self-respect and self-reliance of its beneficiaries. Such a plan is that of the Blind Men's Working Home, Philadelphia. To it I give the first place, and without further remark I shall proceed to give a short account of it.

BLIND MEN'S WORKING HOME, PHILADELPHIA.—This establishment is virtually a broom manufactory.

Carpet-weaving, chair-caning and mattress-making are also carried on, but the chief business is broom making. Until last year brush-making was followed, and in the years 1880-82 a large number of cigars were made. Why these trades were dropped will appear further on. The Blind Men's Working Home was founded in Philadelphia in the year 1874. Its founders never expected that the enterprise would be self-sustaining, and an annual deficit has always been looked upon as a necessary, though unfortunate, part of the undertaking. The two chief causes of this annual deficit are the employment of unskilled labour and the fixing of the rate of wages. In a broom manufactory managed by private enterprise, apprentices are not sought, not even willingly accepted. None but skilled workmen are employed, and certainly none but such are well paid. In the Philadelphia home all kinds of workmen are employed, even those who are certain never to become first-class workmen. The material wasted by the large number of apprentices, who are taken from every walk of life, and not specially from the mechanical, is very considerable. But where the custom of this place is most at variance with the ordinary practice of the business world, is in employing its workmen whether times be good or bad, and in paying to the least valuable of them a wage sufficient to maintain them.

From what has been said it is evident that the Blind Men's Working Home does not even pretend to be a business enterprise. As an indication of its prosperity I may say that an addition to the factory

has been built recently, increasing its floor space by some 20,000 square feet. For many years Mr. H. L. Hall, himself a blind man, has been superintendent and business manager of this home, and it is chiefly through his efforts and those of his colleagues that it has been so successful. Mr. Hall and his friends have also done much to induce other cities to follow Philadelphia, and Chicago and Brooklin have done so lately, and New York philanthropists are inquiring into the ways and means. Of course this establishment is a home as well as a factory. The most of the workmen reside on the premises, are well housed and well fed. Beyond all doubt or question this is the best way of dealing with the indigent blind.

THE SAXON SYSTEM AND THE DRESDEN SCHOOL.—The Saxon system is a plan whereby the Dresden Institute relieves the temporary distress of its graduates. It is the most practical recognition of a principle everywhere adhered to in Europe, but nowhere followed in America, viz: It is the duty of a school for the blind to keep in touch with its graduates. In Europe this principle, when acted upon, has been found not only helpful to the ex-pupils, but highly beneficial to the school itself. It is the duty of the superintendent of the Dresden school to visit the school's graduates from time to time, and if he find any needy and deserving, they are assisted from a fund created for this purpose many years ago. This system is a far less delicate way of giving relief than the Philadelphia plan, but it has this great advantage,

that it does not break the home ties, a very important consideration indeed. A full and interesting account of the origin and working of this system may be found in Armitage's work. Besides being remarkable for its relief of the Saxon blind, the Dresden school is noted for the great attention which it pays to the teaching of trades, of which brush, rope, and basket-making are the chief It must not be supposed, however, that elementary education is neglected,

Broom-Making.—This is the chief trade taught to the blind of the United States. Every American institute gives instruction in it. But how far the blind trained in these institutions are enabled to maintain themselves by following this trade cannot be guessed at even, because no effort has been made to collect the information upon which an opinion might be based. That Mr. Hall partially succeeds in the Home forms no criterion, as collective labour often succeeds where individual fails.

The making of brushes, ropes, mats and nets, and the caning of chairs are trades sometimes taught to the blind. According to Armitage none of these trades are very remunerative to the English blind who follow them, though they are of great use for manual training. In America they are little taught and are practised mostly by individual blind men. Brush-making has been abandoned at Philadelphia for purely economic reasons, I believe. Chair-caning is a good enough trade in itself, but the sort of chair on which such work is put is no longer very extensively manufactured.

BASKET-MAKING. — Armitage considered basket-making a good trade for the blind. It may be so in England, but it is not the case in America. The reason for this is, I believe, that in England the people are willing to pay the high prices at which alone basket-making is remunerative while in America they are not. In America, basket-making is taught chiefly at the Ontario Institute for the Blind, Brantford. Basket-making was condemned as unsuited to the wants of the blind more than forty years ago by the New York School for the Blind, and was altogether abandoned by it several years before the Ontario institution was founded. Disregarding the verdict of the New York School, this trade was introduced at Brantford, and has been taught there ever since. In 1893, the Toronto Trades and Labour Council issued a circular to the blind basket-makers of the Province, ex-pupils of the Ontario institution, asking them to report on their success. Sixty odd circulars were sent out, of which one-third were answered; and among the replies not one favourable to the trade was found. Further, before a committee of this Council, Mr. Charles Watts, a basket-maker who had employed two of the best workmen that the institution had ever turned out, declared that it was impossible for a workman using models to earn more than $2 per week. Brantford is the only place in the world where models are used, and it is claimed there that working with them does not destroy the workman for free-hand work. From these facts it may be seen that though basket-making

may be useful for manual training, it is useless as a means of support.

In Ontario, none of these trades are remunerative, not even broom-making, chiefly because it is followed in the Central Prison, and everyone knows that it is impossible to compete with prison labor. The experiments of Mr. E. Boyne, of Toronto, and others, have shown that broom-making is unprofitable at present. When the results of the Trades Council's investigation were laid before the Government, a curious statement, to put it mildly, was made by a high official. The Institution for the Blind is in the same department as prisons and asylums. One of the high officials of this department said that from what he knew of broom-making in the Central Prison it was impossible for a blind man to make brooms. Now, as a matter of fact, at that time, as now, there was not an institution in the United States in which broom-making was not taught, and over five million brooms had been made by blind workmen in the Philadelphia Home. It seems to me high time that the institution for the education of the blind should be transferred to the Education Department, where it rightly belongs. The blind are neither idiots nor criminals, and no matter how well qualified persons may be to superintend prisons and asylums, it does not follow that they know how to deal with the blind.

In Ontario, upholstering and bookbinding have been successfully followed by individual blind men, and as both are excellent trades, an effort should be made to

find out how far they might suit the blind generally. Cigar-making was abandoned by the Blind Men's Working Home, because it was thought that a charitable institution was not exactly the place in which to encourage the use of tobacco by its manufacture. Individual blind men might find it a good opening.

Piano-tuning is the only trade not specially mentioned in this outline. It is so important and so well suited to the wants of the blind that a separate chapter has been devoted to it.

CHAPTER XV.

AN AGENT'S WORK AND SMALL STORE-KEEPING AS VOCATIONS FOR THE BLIND.

AN AGENT'S WORK.—In the commercial world the blind must choose those vocations which require a personal venture. It is as agents, and not as clerks, that they must look for employment. It will be impossible, in a short sketch like this, to enumerate all the various kind of agencies open to the blind, or even all those in which blind men are at present actually employed. I can only notice a few of the more ordinary and more practicable. As I have already said, the plan of the New York School is to fit its pupils for commercial life, and I think that this plan cannot be too highly recommended for general adoption. Every year people are becoming more and more desirous of securing specialists and confining their own attention to special lines of thought and action. In commerce, as well as in art and science, the tendency to specialize is steadily increasing. An insurance agent is a specialist in certain kinds of investment, just as an entomologist is a specialist in a certain form of animal life, and a careful training is quite as necessary to the one as to the other. The blind, by reason of their increased mental activity, are peculiarly adapted to

specialize in commerce, and the plan of the New York School gives to this principle practical recognition. To engage in this work requires no capital, a fact which brings it within reach of the blind. The whole of the progress made by the Toronto associations of the blind has been along this line.

INSURANCE.—It is generally supposed that no particular ability is required to become a successful insurance agent. Nothing can well be imagined more erroneous than this supposition, as many have discovered to their sorrow. Some of the cleverest men of the nation are engaged in this business, and only such can make a success of it. Many efforts have been made to bring this honorable vocation into disrepute, and it is to be regretted that circumstances have sometimes helped to do so. It is true that insurance frauds have been numerous; yet nothing can be adduced more in favour of insurance than to point to the great and increasing number of reputable companies. Both fire and life insurance are open to the blind. I myself have been offered agencies in both, and at present I hold an agency for the Commercial Union Assurance Company, one of the strongest fire companies in the country. I have worked for this company, and my work has been profitable and, I believe, satisfactory to my employers.

DEALING IN PIANOS, ORGANS AND SEWING MACHINES, ETC.—I know of no blind man in this Province who deals in sewing machines, yet I find it among the occupations followed by the blind in American statistical tables; and I know of no reason

why it should not be followed by the Ontario blind. I mention it here because it is often advantageously combined with dealing in pianos, organs, etc., by sighted agents—a plan which should also be followed by blind agents. Several blind men in different parts of this Province deal extensively in pianos and other musical instruments. Before entering law, Mr. Stewart made a great success of this business in Lancaster, Glengarry. Piano tuners, as a rule, sell pianos as well as tune them. It is a very profitable calling for the blind, because of the general belief that the blind are very musical.

DEALING IN COAL AND WOOD.—It has been in this business that the blind associations of Toronto have met with their greatest success. The Associated Blind, as I have already mentioned, was merely an association of blind coal and wood agents. The business is very remunerative, and an energetic and persistent agent can make money by following it.

DEALING IN TEA AND OTHER GROCERIES.—Several members of the Self-help Club follow this vocation successfully. Their plan is to solicit orders from house to house, and in this way a regular connection is established. It is found to be very remunerative. Some blind men carry this principle too far, and the wares they offer for sale form merely an excuse for begging.

The chief objection to most of these agencies is that a blind man is generally compelled to employ a guide in order to follow them. In some cases this eats up all the profit, and renders useless vocations which are, in

other respects, satisfactory. Yet, in the majority of instances, the occupation is lucrative enough to meet this demand. These, and almost every other kind of agency, may be taken by the blind. They are honorable, profitable and necessary businesses, and require careful training and large experience, quite as much as do any of the other branches of commerce, in order to be successfully followed.

SMALL STORE-KEEPING.—Perhaps what I have called small store-keeping might be better named retail business; but as I wished to bring out that it is chiefly in businesses where labour and capital are supplied by one individual that the blind do engage, I have called it small store-keeping. I do not by any means wish to imply that the blind cannot manage large commercial operations, but, as great capital and blindness are not often found together, I treat of the smaller operations, which do occur frequently.

TOBACCO STORES.—Two blind men, of Toronto, are engaged in the tobacco business. One is Captain Andrews,* of life-saving fame, who has a small shop on Yonge Street; and the other is a Mr. John Milsom, on Queen Street West. Both these merchants are doing fairly well, so I understand. The way the goods are made up, and the ease with which it can be arranged and handled by them, are the chief causes of its fitness for the blind. Looked at from a purely business point of view, and taking no account

*Since this was written, Captain Andrews has given up the tobacco business for personal reasons.

of its moral aspect, the tobacco business is a very good one for the blind.

CANDY SHOPS.—I am not as familiar with the way in which the blind manage these shops, as I am with their methods in other employments, yet I know a Mr. James Leaney, of Port Dover, who carries on a thriving trade in sweetmeats and other edibles. Whether or not the business generally is profitable I cannot say.

Music stores are sometimes kept by those whose chief business is dealing in pianos, etc. There is nothing in such a concern which cannot be managed by a blind man. Mr. F. W. Johnston, Secretary Ontario Association for the Blind, was at one time engaged in the bookselling business on Yonge Street, Toronto. In the great financial depression of 1893, when so many of Toronto's booksellers went under, Mr. Johnston was among the number. All sorts of shop-keeping require some capital, so that the degree to which any of these vocations is open depends upon the amount of capital at the disposal of an individual. Of course, no action could be taken to place the blind in such businesses, yet every blind man should be given a training which would fit him to enter such pursuits, and a good commercial course should form a part of the instruction in every well-managed school for the blind. Of course, these are not all the kinds of shop-keeping engaged in by the blind, yet they are the chief.

CHAPTER XVI.

MUSIC AS AN ART AND AS A PROFESSION FOR THE BLIND.

THAT the blind have a keen appreciation of the art of music has already been shown. Here I have only to explain how the art is learned by them. The chief aid to its study is a system of tangible musical notation. Formerly such a notation was little used, it being thought that the blind might rely altogether on their memory. Now, however, a musical notation is considered to be of the same value to the blind as to the sighted student.

The history of the attempts to devise a system of tangible musical notation runs parallel with that of tangible print. Almost every inventor of a system of tangible print endeavoured to adapt his system to the expression of music. Moon, Frere and Lucas each made such an attempt. Their systems never came into general use. The first attempt made was to emboss the ordinary staff of five lines. But for rapid reading by touch it is necessary that the finger in contact move only in one direction, and as the ordinary staff requires a vertical as well as a forward motion, reading it by touch was a very slow process. Its great value is that it enables blind teachers to explain to their sighted pupils the ordinary musical notation.

THE BRAILLE MUSICAL NOTATION.— The most generally used and perhaps the best system of tangible musical notation is that invented by Louis Braille himself. It is used in all parts of the civilized world except some of the States in America, where Wait's system is employed. Its basis is the Braille alphabet in its arrangement into the four rows of ten. The last seven letters of each row stand for the notes. Those of the first row are the whole notes; of the second, the halves; of the third, the quarters; and of the fourth, the eighths. The signs for the whole notes stand also for the sixteenths, and those for the halves, for thirty-seconds, etc. This use of the same signs in two senses produces no confusion, as a bar consisting of one-sixteenth or of sixteen whole notes is an impossibility. The notes require only twenty-eight of the sixty-one signs of Braille, leaving thirty-three for the expression of the other signs and terms used in music. In both Europe and America this notation is identical. The designers of American Braille have made no changes in it.

At a congress of Instructors of the Blind, held at Cologne in 1888, the significance of the four rows was reversed, the eighth notes being represented by the signs of the first row, and the quarters by the second, etc. As bars of one-eighth and one-fourth notes are more frequent than those of wholes and halves, it was thought that they should be represented by the fewer points. And this alteration has been generally adopted in the Braille world.

WAIT'S SYSTEM OF TANGIBLE MUSIC.—This system is based on the New York system of tangible print. The pitch of tones is indicated by the first seven numeral signs, and the time by the same sign affixed to the pitch signs. Thus a sign indicating both pitch and time is formed four points in length. The interval and octave signs are also derived from the numerals. The former by the addition of a lower and the latter by the addition of an upper point to each of the signs. The remaining characters of the New York system are used to express the remaining musical signs. The chief objection urged against this system is that the use of signs four points in length makes it difficult to read. How much force there is in this objection I am not prepared to say. It may be that some blind persons, a large number even, are not able to read it, but so far as my personal experience goes, I know of few who have failed to master it. To my mind the greatest objection to it is that it is not so extensively used as the Braille, and it is pretty generally admitted that a system of musical notation should be as universal as possible. The production of music, either in Braille's or Wait's system, is not a very expensive process. By the old methods it could be produced for the blind as cheaply as music for the sighted. By the stereo-machines it can be produced at a cost very much less. A system of tangible music enables the blind to be far more independent of sighted help than they would be without such aid. For an advanced musician it is better for him to hire a seeing reader if his time is very

valuable, yet the embossed copy is always of great use to him, as the finest artist will often forget notes in pieces which he has not played for sometime.

BLIND ARTISTS.—The best proof of the skill of a musician is his ability to maintain himself by the practise of his art. No doubt great artists have sometimes failed to do this. It is one of the strangest and commonest occurrences. Such artists seem to be too good. Their love for their art is so great that they refuse to make of it a means to an end. Many of the blind fail for this very reason. The skill of the blind artist depends on the same causes and conditions as does that of the sighted one. The majority of great artists, both creative and reproductive, have been persons whose hereditary tendencies to music have been of the highest type. Blindness serves to refine and intensify such tendencies, so that great blind artists have been comparatively numerous. In those cases where blindness intervenes, and limits a person not of marked musical tendencies, a fairly successful musician is often the result.

BLIND TEACHERS OF MUSIC.—That this profession is one well suited to the blind long experience has proven. In all parts of the world there are a few blind persons who teach music. In France, England, New England and Pennsylvania these teachers are especially successful. It is impossible to obtain much information as to the amount of this success, but it is estimated that about 40 per cent. of them are successful. As high, if not higher, than in normal conditions. In Ontario some three or four succeed as music

teachers. It is true that only a few attempt to follow this profession here, but the reason of this is that few are trained for it. In order to teach music to the sighted the blind must know the ordinary staff. Now, when I was at Braniford, although there was an embossed sample of this staff in the music library, no systematic effort was made to teach it to the pupils. I was in the music class for seven years, and would likely have known if such an attempt were made. In Toronto there is only one successful blind music teacher that I know of, and in the Province there are not more than half a dozen altogether.

BLIND ORGANISTS.—As organists the blind succeed well. In Paris, London and Boston schools many have been sent out who now hold positions as church organists. In Philadelphia alone there are no less than eight of the graduates of that city's school employed as organists. In Ontario there are a few —W. A. Wells, of Brockville, an associate of the Toronto College of Organists, and Munro, of Belleville, are among the more successful. The organ at Brantford is fairly well taught, and the graduates from the organ class generally succeed as musicians in some line, though they do not always obtain positions as organists.

The cornet, violin and other wind and stringed instruments are often well played by the blind. Nearly all of the best schools for the blind teach the violin and have a full orchestra. There was at one time a band at Brantford, but it was taken away when the organ was introduced. There is a great difference

of opinion between the English and French authorities with regard to the usefulness of a band to a school. M. de la Sizeranne considers it essential to a finished musical training, while Dr. Armitage does not. I am inclined to agree with the Frenchman. Not so much because of the technical advantages of orchestral music, but on account of its general benefits. It is a pleasant pastime, good exercise, and a fine, physical training for all the more important of the remaining senses.

The special schools whose graduates are most successful in maintaining themselves by the profession of music are undoubtedly, the Institute des Jeunes Aveugles, Paris; the Royal Normal, Norwood, London; the Perkins Institute, Boston, and the Philadelphia School. The causes or conditions of this success are stated by Dr. Armitage in his sixth chapter of his book on the "Education of the Blind." These conditions are in substantial agreement with M. de la Sizeranne's views. Few of these conditions exist in Ontario, and as all are necessary to success it is not to be wondered at that failure is so common here. I shall give these conditions in full, as I cannot express so clearly and forcibly as Armitage does, and his opinion on this matter is of far more value than mine would be. Every effort should be made, both by the Government and by everyone interested in the blind, to bring such conditions about.

"CONDITIONS OF SUCCESS IN TRAINING BLIND MUSICIANS.—1. The aim must be to form artists who shall not be inferior to seeing artists trained at the best conservatories.

2. "The school must contain a large number of pupils, so that proper classes can be formed.

3. "The school must have a large income, in order to command the services of the best teachers and to possess pianos and organs in sufficient numbers to give each pupil the opportunity of some hours of daily practice.

4. "The kindergarten and literary work should also be thoroughly good.

5. "No person with sight who intends to occupy the rank of a first-rate professional artist is satisfied with the teaching of the professors, however good, of the school in which he was trained. He seeks in addition the teaching of the most eminent artists of Europe. In like manner the blind need not only thorough elementary and other teaching from the music teachers of the school, but they also require teaching from the most eminent outside professors that can be found. This involves considerable expense, and obliges the school to be situated at a large musical centre.

6. "For the same reasons the pupils should have opportunities of frequently hearing the greatest musical masterpieces rendered by the most eminent performers of the day.

7. "Tuning will always be one of the best employments for the blind, and this is another reason why the school should be in or near a large city, where large piano factories exist, so that the tuners during their last year may tune along with seeing workman and be able to practice on a great variety of instuments."

I remarked in the first chapter that I would have something to say about giving exhibitions of the work of the blind. Nothing can be more beneficial than these exhibitions when they are not conducted in the spirit of "See what we can do," as Mr. E. E. Allen so aptly terms it in a late report. A school is very apt to make its annual concert its chief aim and the whole work of the session subservient to this end. For months before the Christmas and June concerts at Brantford the whole energy of the institution was directed towards these displays, and too often the spirit of them was "See what we can do." There should not be more than one concert in a year, though exhibitions of our real work might be more frequent. The object of such entertainments should be instructive as well as amusing to our visitors.

CHAPTER XVII.

TUNING AND REPAIRING OF PIANOS AND ORGANS.

TUNING is sometimes considered a branch of the profession of music. It is so treated by Armitage. Though the tuned instrument presents artistic arrangement of tones, the process by which this result is obtained is so mechanical in its nature that I prefer to call tuning a trade. It has no more right to be considered a branch of the art of music than has the painting of fences a claim to be treated as a part of the art of painting.

PIANO-TUNING.—Tuning is the best and most remunerative of all the employments open to the Blind. This point is pretty generally agreed upon by the trades instructors of the blind, and by the blind themselves. There are few institutions in which it is not more or less efficiently taught. Its greatest advantages are that it requires only average intelligence, fair mechanical dexterity, and a good ear to insure success in it, and that it can he taken up at a later period in life than any of the branches of the musical profession proper. Its greatest disadvantages are that the blind workmen must excel sighted competitors in order to succeed, and that the majority of people have not ear enongh to tell when an instrument is well tuned. In spite of these great disadvantages the blind tuners in most countries and

in the majority of instances are able to maintain themselves by following their vocation.

It is a very difficult matter to find out what is the exact, or even approximate proportion of the successful to the unsuccessful blind tuners. In France, according to Armitage, about 30 per cent. of the total number of the graduates of the Paris school are successful. It is probable that this would be about 75 or 80 per cent. of its graduates in tuning. The success of the Royal Normal and of the Perkins Institute is said to be quite equal to that of Paris. The conditions of this success were quoted in the last chapter. Since Armitage held tuning to be a branch of the profession of music, what he says of music applies to tuning also.

So far as I can learn from observation not more than 20 per cent. of the Brantford tuning graduates support themselves fully by following their calling. More than these vague generalities it is impossible for me to give. Beyond all doubt or question piano tuning offers a better opening to the blind than any of the other trades. The reason why the percentage in Ontario is not higher is that the trade is not well taught. The instructor at Branford, Mr. W. G. Raymond, is a most capable person, but as he has large interests in the city and only visits the institution two afternoons a week, he cannot be expected to give a very thorough training to his pupils. I have questioned several of the most successful graduates upon this point, and I have always received the answer: That,

though they learned the elements of piano-tuning at the school, without the training afterwards received in the factory they had no right to consider themselves tuners at all.

How tuning came to be one of the possible openings for the blind forms a most interesting and instructive illustration of the principle so often reiterated in these pages, viz.: The blind know better what is suitable for them than the sighted do. What Haüy's idea of printing in relief on paper has been to the education of the blind, Montal's discovery of tuning has been to their employment. Montal deserves to be always remembered by us, and no blind man should write of tuning without giving some account of him and his work.

MONTAL.—At the time when Louis Braille was perfecting his system of tangible print in the Institut Nationale des Jeunes Aveugles, Paris, another great achievement was in process of completion within its walls. Claude Montal was demonstrating that blind men could tune pianos. In 1830, Montal and a blind friend undertook to tune one of the school's practice pianos. Their attempt was reported to the director by the sighted tuner who had these instruments in charge. Montal was ordered to leave the pianos alone. He was so convinced, however, of the feasibility of tuning for the blind that he procured an old piano, and obtained permission to keep it in the building. In time the director became converted to Montal's way of thinking, and regular instruction in tuning was begun. Montal soon left the school, and after a time succeeded in building up a paying connection. At

first he had to contend with the prejudice against blind tuners, which still exists everywhere to some extent. It is particularly strong in some parts of Ontario, though it is rapidly being overcome. As a piano is often worth more than the house in which it is kept, people do not like to entrust it to the care of a blind man. Montal made his great stroke when he succeeded in bringing into unison two instruments of different construction, and by different makers—a thing which the best sighted tuners in Paris had not been able to do. Eventually Montal became a piano-maker, and now there are established in Paris five former pupils of the Institut des Jeunes Aveugles, engaged in the manufacture of pianos. Montal also worked out a new theory of tuning, published treatises containing it, and often lectured upon it. In 1834 he was employed by most of the great piano makers to tune their pianos for the Industrial Exhibition of that year. These makers also always made it a custom to send blind tuners to those of their connection who were most particular about the tuning of their instruments. All this goes to show that in France, at least, the blind are recognized as the best tuners.

Piano Repairing.—This is a distinct trade from piano tuning, though they are frequently practised by one individual. It can be easily learned by the blind. That it is not taught at Brantford is to be regretted, since blind tuners often lose the confidence of the public in them as tuners, because they are unable to make slight repairs. The public do not understand that these trades are distinct, and suppose that the

blind man is not master of his trade. Sighted tuners do not often attack their blind competitors, and when any such attack is made it is usually by an imposter, and not by a tuner at all. These trades are peculiarly open to imposters, because of the prevailing ignorance regarding them.

ORGAN TUNING AND REPAIRING.—These two trades are distinct, both from each other and from piano tuning and repairing, though all four are sometimes practised by one person. Montal was the first to begin this work also. He made extensive repairs in the chapel organ at the Paris school, and this was followed by many more successful attempts. These trades are not generally taught to the blind. They should be, however, as in rural districts organs are much more numerous than pianos. Mr. John Atkinson, of Streetsville, a graduate of the Ontario Institute for the Blind in tuning, is the only person of my acquaintance who attempts to tune and repair organs, and he makes a success of it. Mr. Atkinson has worked out this business for himself, and his efforts deserve great credit. Why cannot others do what he has done?

The successful tuners of this province are, for the most part, employed by the large manufacturers. Two are employed by Heintzman at Toronto Junction; three by Mason & Risch. Nordheimer and Williams have also employed blind tuners. Perhaps the most successful of all is Mr. Sanford Leppard, who is a native of York County, and is employed in Gourlay, Winter & Leeming's music store, on Yonge Street Toronto.

CHAPTER XVIII.

THE LEARNED PROFESSIONS.

THE name learned professions is the generic term for theology, law and medicine. There is a tendency, however, to give to it a wider significance, and to regard teaching, journalism, pharmacy, dentistry, veterinary surgery, music, and many other scientific vocations as learned profesions. I shall use the term in its broader meaning, not so much from a desire to infringe upon the time-honored monopoly of the old trio as from inability to find any other place to treat these secondary professions in my work.

TEACHING JOURNALISM.—Every kind of literary work is, more or less, open to the blind. Teaching journalism and general literary work require a kind of ability not to be found in the majority of the blind any more than in a majority of any other class. Nevertheless there are many blind persons who might succeed in literary work, and no pains should be spared to develop any natural ability. Teachers, journalists, lecturers and even authors might be found, for whose work the world would be glad to pay. When the field of employment is so limited every effort should be made to open up these vocations. From their psychical life we have seen how peculiarly well fitted the blind are for such work. From their

past achievements in literature we have evidence enough in favor of their chances of success. A good education and some literary training should therefore form a part of every special school's curriculum. The blind, as instructors of the blind, have, as I have frequently said, been most successful. F. J. Campbell, the Principal of the Royal Normal College, has made that institution one of the best in the world. Mr. W. B. Wait, of the New York school, has been mentioned so often by me that I need only name him. Samuel Bacon, of Ohio, and W. H. Churchman, of Indiana, have also been noticed. As I have said before, it is only in those schools where blind teachers are employed that great success is achieved.

THE CHURCH.—It is in the Church that the greatest achievements in the professions have been attained by the blind. The Churches of Rome and of England, however, object to persons who are physically defective entering their ministry. The idea is to keep the Church from becoming a refuge for the deformed. There is a certain amount of reason in this objection, it is true, yet it seems to me that the Church would have done better to have seen to the exclusion of those hideous moral deformities who have crept into her ministry than to the shutting out of the physically weak. Other Churches have not been so hard upon physical defects, and many blind men have done, and are still doing, good work in the cause of religion. The names of such men as Douglas and Milburn are not likely to be soon forgotten. As far as I can discover, the blind persons who have assayed the

ministry have made a success of it in the true sense of the word, and Douglas and Milburn hold the highest rank among Christian workers. A brief account of each of these great men will be of interest and profit to my readers, as well as prove the correctness of my theory of the blind psychical development.

DOUGLAS.—George Douglas, one of the greatest preachers and orators that the Canada Methodist Church has ever had, was born near Scott's home at Abbotsford, Scotland, in 1825. His parents were staunch Presbyterians, and George was brought up in that faith. In 1832 the Douglas family emigrated to Canada. In 1843, Douglas joined the Methodist Church, and some years later qualified himself for its ministry. For two years he laboured as a missionary in Bermuda's isles, but was forced to give up the work on account of a violent fever, from the effects of which he never fully recovered, and returned to Canada. For the next twenty-five years he was regularly engaged in Church work. He was stationed at Montreal, Toronto, Hamilton and Kingston, and everywhere left behind him a good record. In 1873 the Montreal Wesleyan College was founded, with Douglas as its principal. In 1877 Douglas became blind. At first this misfortune threatened to crush him, but after a time he rallied, and for sixteen years faithfully and cheerfully finished his life's work in the discharge of his office. Saturday evening, February 10th, 1894, when his week's work was done, Douglas passed quietly away.

George Douglas had made a great reputation years before he lost his sight. Yet after his blindness his intellect lost none of its strength, and his voice none of its eloquence. His later life is a complete refutation of the statement that blindness, when it comes to the young, may be no misfortune, yet when it afflicts the elder it is insurmountable.

MILBURN.—Willam H. Milburn, the distinguished preacher and lecturer, was born in Philadelphia in 1823. His blindness resulted from one of the most revolting cases of malpractice on record. When five years old he was struck in the eye with a missle in the hand of a playmate. The wound healed, leaving a slight protuberance on the eye. This the physician determined to remove. The operation was painful, and the boy protested against its repetition, and finally resisted. The doctor seized him in his arms, and in the struggle both of the child's eyes were dashed with the caustic. The physician's folly cost Milburn his sight. He was educated at the Illinois College at Jacksonville, where he studied with the small amount of sight left him. In later life he became totally blind. At the age of twenty he was admitted as a travelling preacher to the Methodist Illinois Conference. He was a bold and fearless preacher. A striking instance of his character happened when he was but twenty-two years of age on an Ohio River steamer. He rebuked a number of Congressmen on board, telling them in a sermon that they were patrons of drunkenness, debauchery and gambling. This attack so astonished the gentlemen that

in appreciation of his fearless honesty they offered to make him Chaplain to Congress, a promise which they afterwards fulfilled. He was several times re-elected to this office.

In four of the six years of his ministry in the South he preached 1,500 times, and travelled 60,000 miles. He travelled alone chiefly, and tells us that in all his wanderings that only once was he refused help in getting about when he asked for it.

In the summer of 1855 he prepared a course of lectures, entitled "Sketches of the Early History and Settlement of the Mississippi Valley," first delivered before the Lowell Institute in Boston, in December of the same year. Ever since he has been one of the most popular of American lecturers, and is a living protest against his own theory that the blind cannot become great orators.

G. L. Howie is a native of Syria, and a graduate of Edinburgh. While pursuing his studies at the university he became blind. Yet notwithstanding this he took the degrees of M.A. and Ph.D. When in Edinburgh he was employed by the Edinburgh Home Teaching Society as one of their distributors of books to the blind, a work which he performed to the satisfaction of both the society and the blind themselves. On coming to Canada he was engaged as a regular Presbyterian clergyman, and as a special missionary. In 1894 he returned to his native land. While in Toronto he was Vice-President of the Self-Help Club, was an efficient officer and an agreeable colleague.

The blind are proverbially cheerful, and this characteristic is especially prominent in their ministry. Milburn used to call himself the Minister of Cheerfulness. In the United Kingdom and the United States there are comparatively a large number of blind men engaged in this work. In China the Rev. Mr. Murray, a Scotch missionary, has found a new occupation for the blind of that country. He first converts them, and then makes of them native home missionaries.

THE LAW.—The legal profession is open to the blind, and although the people are just a little chary about entrusting their business to a blind man, time overcomes this hesitancy, and the blind lawyer's success usually equals his deserts. There are many successful lawyers in England and in America, and in the latter country several have risen to the bench. Right here in Ontario we have one blind lawyer, Mr. W. Stewart. He is the only blind person yet admitted to the Canadian bar, but it is hoped that he will not be the last. For some years he practised in Toronto, but finding that the profession was too crowded there, he removed to Lancaster, where he is, I understand, rapidly working himself into a good practice.

The difficulties which this profession present to the blind are not so very great, either in its study or practice, and a blind man who has a taste for law has a fair chance of success.

MEDICINE.—In the medical profession there are also some successful practitioners who are working without the aid of sight. Although no blind person can

possibly do the work of a general practitioner, yet there are several branches of this profession for which the blind are peculiarly fitted. Most important among these are pulmonary diseases and scientific massage.

PULMONARY DISEASES.—In treating the lungs the blind may attain great success. Their acute hearing, it is claimed, enables them to detect with greater accuracy and definiteness the specific character of whisperings and murmurings. Dr. Babcocke, a blind physician of Chicago, is not only professor of pulmonary diseases in Chicago University, but has also the largest practice in this specialty in that city.

SURGERY.—It seems to some perhaps that my enthusiasm has run away with my judgment when I state that there are some kinds of surgery, especially operations on internal organs, which can be performed without the aid of sight; nevertheless, it is a fact. Dr. Cocke, a blind surgeon of Boston, successfully performs delicate operations of this character.

OBSTETRICS.—Though I know of no blind midwife, I am assured by doctors that there is nothing in the operation which cannot be done without the aid of sight. I am told, also, that as a matter of fact, regular practitioners rarely invoke the aid of sight in performing this function.

MASSAGE.—Massage is a treatment which has fallen into disrepute through its prostitution. Yet all the great fathers of medicine testify to its value and efficacy. Hippocrates, Galen, and all the other great authorities of the ancient world recommended it. It is

well spoken of in Homer, Cicero, and in the Sanscrit and Chinese classics; and modern science is beginning to fine out and appreciate its great worth.

Massage is from the Greek *masso*, "I knead or handle," and embraces all the varied forms of manual therapeutics. It signifies a group of procedures which are accomplished with the hands, such as friction, kneading, manipulation, rolling, percussion of external tissues of the body in a variety of ways, with either a curative, palliative, or hygenic object in view. Massage may be curative, beneficial, neutral or injurious, and great skill and judgment are therefore necessary in its employment. It has great physiological advantages, both for external and internal organs, and often succeeds where other treatments fail; but its chief use is in neurasthenia.

The blind are peculiarly well fitted for this vocation. The masseur must have an especially fine dermal sense, and this sense is usually highly developed in the blind. In India and Japan the terms "blind person" and "masseur" are synonymous. In Switzerland, France and America there are also some blind masseurs. The Missouri School for the Blind has recently begun to give regular instruction in massage, and its progress will be watched with interest by those who are anxious to see the number of lucrative employments open to the blind increased. Massage is constantly becoming more popular, and the blind will do well to take up its practice.

PART IV.

MISCELLANEOUS.

CHAPTER XIX.

ON THE PREVENTION OF BLINDNESS AND DISEASE OF THE EYE.

IT is not my purpose here to do more than to call attention to the preventable causes of blindness, and to say a few words upon the diseases of the eye which commonly result in blindness or considerable diminution of vision. The following table, prepared by James L. Minor, M.D., Assistant Surgeon New York Eye and Ear Infirmary, and Visiting Ophthalmic Surgeon, Randall's Island Hospital, New York, published in his article on blindness in "A Reference Handbook of the Medical Sciences," Vol. I., page 537, will serve this end admirably. Approximate, not absolute, accuracy is claimed for this table.

PREVENTABLE CAUSES OF BLINDNESS.

	Per cent.
Ophthalmia Neonatorum	10.876
Trachoma and Blennorrhœa	9.492
Diphtheritic Conjunctivitis	0.356
Choroiditis Myopia	0.949
Detachment of Retina	3.746
Glaucoma	8.000
Sympathetic Ophthalmia	4.509
Gonorrhœal Ophthalmia	0.910
Disease of the Eye from Small-pox	2.216
Intoxication Amaurosis	0.039
Total	41.093

PROBABLY PREVENTABLE BLINDNESS.

	Per cent.
Diseases of the Cornea	4.034
Direct Injuries to the Eye	2.017
Unsuccessful Operations	1.978
Irido-choroiditis, Cyclitis, Iritis	4.430
Detachment of Retina	1.000
Glaucoma	0.978
Unclassifiable	1.681
Disease of the Eye from Syphilis	0.238
Choroiditis, Choroidoretinitis	0.369
Idiopathic Optic-nerve Atrophy	2.000
Optic-nerve Atrophy—Cerebral	2.000
Optic-nerve Atrophy—Spinal	0.333
Typhus, Measles, Scarlatina, etc.	1.165
Total	24.189

UNPREVENTABLE BLINDNESS.

Disease of the Cornea	4.034
Direct Injuries of the Eye	2.017
Tumors of the Eye and surroundings	0.356
Irido-choroiditis, Cyclitis, Iritis	4.430
Injuries to the Head	0.277
Scrofulous Diseases	0.039
Unclassifiable	1.681
Disease of Eye from Syphilis	0.238
Choroiditis, Choroidoretinitis	0.738
Idiopathic Optic-nerve Atrophy	5.751
Optic-nerve Atrophy—Cerebral	4.961
Optic-nerve Atrophy—Spinal	2.000
Typhus, Measles, etc.	1.165
Irido-choroiditis with Meningitis	1.424
Other causes, including 3.835 per cent. of congenital blindness	5.412
Total	34.523

On examining this table we are struck with the high percentage of the preventable causes of blindness. Four out of ten blind persons are needlessly blind, and probably two of the remaining six should be able to see well. We must remember this, however, that many of the preventable causes of blindness are frequently not actually prevented. Yet with the advance of civilization the number of cases actually prevented is increasing. With all such classes I am not concerned. It will merely be a matter of time when ophthalmia neonatorum and trachoma will be almost altogether unknown diseases. There are, however, on the list two diseases which do not diminish, but actually increase with the advance of civilization, and about these I have something to say.

Choroiditis myopia and detachment of the retina furnish nearly 6 per cent. of the blind. The cause common to each of these conditions is myopia, and merits careful consideration. It may be said to be an outgrowth of civilization and education, and may be taken as an indication of a nation's studious habits. Myopia (short sightedness) is almost peculiar to educated people, and is seldom if ever found in the ignorant and barbarous. At present there are many causes at work calculated to increase the number of myopes. The long hours of confinement in class-room and study, and the lack of sufficient out-door exercise and fresh air, tend to cultivate sedentary habits and to lessen the resisting power of the tissues of the body. The close application of the eyes at near work with badly constructed desks and insuffi-

cient light bring on congestion of the fundus of the eye, and straining and bulging of the sclera at the point of least resistance, and the consequence is the development of myopia. This condition once produced, is increased by a continuation of the causes which induced it; and in unpromising subjects even the removal of these does not put an end to it. The increase and development of myopia are nowhere better shown than in the following table taken from Fuchs and prepared by Cohn. (The village school corresponds to our lower grade):

Village school	percentage	of	myopia	1.4	deg.	of myopia	1 / 24.4
Elementary	"	"	"	6.7	"	"	1 / 22.7
Intermediate	"	"	"	10.3	"	"	1 / 21.9
Gymnasium (college)	"	"	"	26.2	"	"	1 / 18.7
University		"	"	50.00	"	"	1 / 12.2

It is furthermore noted that the percentage of myopia increased in each school from class to class. Among theological and medical students, whose term of study is prolonged beyond the ordinary university course, the percentage of myopia is still further increased, reaching, in the case of the former, 78 per cent. Myopia is not congenital, yet the tendency towards its development is certainly transmitted from parent to child. The prophylactic measures against myopia are, therefore, of the utmost importance. First and foremost are a proper amount of outdoor exercise during school life, well-ventilated school-rooms, with good illumination and properly constructed desks, so that the light will fall to the best advantage upon the page, and avoidance of the

habits of stooping or bending the head over the work and of holding objects close to the eyes. After the development of myopia, much can be done for it by the use of atropine and the wearing of properly selected glasses. It should be remembered that myopia fosters sedentary and studious habits, and at times it becomes advisable to discontinue the use of the eyes for near work altogether, and it not infrequently falls within the province of the physician to decide upon the child's future mode of life and employment.

The foregoing is substantially Dr. Minor's account of these diseases. It is full of points with which the people of Ontario should be made familiar. We are a people who claim to have one of the best educational systems in the world. The development of our system in the individual requires the closest eye-work; in fact, the whole teaching of our schools depends almost altogether upon the eyes. To pass from the beginning to the end of our educational process requires twenty years. There are few of our children who do not spend ten years at least in our public schools and collegiate institutes, and a large and increasing number of our youth are struggling to reach the end of this process. It is of vast importance, then, that in this mad rush after university honours we should pause and count the cost. Our schools and colleges are well lighted; yet there are few homes where the artificial light is fit to read by, and the amount of home-work is increasing and enormous. Artificial light can hardly be too strong,

provided that care be taken not to allow the direct rays to strike the eye. It is desirable that the people should be educated, yet is is important not to ruin their eyes in doing it. Is short-sighte ss, then, the penalty we must pay for our education and civilization? To some extent, yes; yet proper prophylactic measures may do a great deal towards lessening this evil effect. Careful attention to what Dr. Minor has said will bring this about, and the authorities should begin at once to put it into operation. Legislation should suppress the publication of books in very small type, and the Education Department should do away with home-work as far as possible. There are numerous illustrations of the increase of myopia in our Province, chief of h is the large increase in the number of people wearing glasses. No doubt this is partly due to the increase in skill of oculists in finding out needs for spectacles, yet the increase is too great to be wholly accounted for in this way. There are many other lessons which may be drawn from Dr. Minor's statements, but which I have no space to deduce. I intend this chapter as a warning merely, and not as a scientific exposition of myopic affections. With the same idea, I shall offer a few suggestions on the care of the eyes in the next chapter. Though what I have to say may lack in scientific accuracy, it may have some weight, seeing that it comes from one who has lost that which he is urging others to preserve, and who knows the value of what he has lost.

CHAPTER XX.

ON THE CARE OF THE EYES AND THE CONSEQUENCES OF NEGLECT.

UNDER this head are grouped a few remarks upon some of the bad habits which, long persisted in, produce permanent injury of the eyes. The bad habits I mention are peculiar to people who read a great deal, and as this class grows larger with the advance of civilization, it is probable that the number indulging in these practices is increasing. I have, therefore, the same interest in pointing out the consequences here as I had in dealing especially with the diseases resulting from myopia in the last chapter. For as myopia is a cause of blindness, and bad habits of myopia, the remote cause of blindness from myopic affections are misuses of the eyes. The hereditary nature of myopia is established almost beyond question, and consequently any large increase in the number of myopes is certain to be followed by a proportionate increase in the number of the blind from myopic affections in the next generation. Such facts make the eradicating of the bad habits referred to a matter of paramount importance.

Reading while lying down is a habit productive of much eye trouble. The strain on the accommodating muscles required to keep the eyes in the

unwonted position, both with reference to the head and the printed page, results in serious derangement of the refracting media: and, in consequence, impairment of vision. Similar troubles result from reading by insufficient illumination, such as that at some distance from the window, that of twilight or moonlight, and that given by small, badly-trimmed artificial lights. But the habit which deserves the severest condemnation is that of reading in bed. It combines, besides the evil of reading while lying down and by insufficient illumination, almost all the predisposing conditions which render the eye prone to disease. Not only are the eyes weakened by this practice, but serious and sometimes permanent injury to the health of the whole body result from it. All these habits should be avoided. No small print should be read, and the reader should get so close to the light that no strain is felt in reading. Finally, when anyone notices vision impaired, a first-class oculist or qualified general practitioner should be consulted at once. Neither quack remedies nor procrastination should be tolerated, as either may be attended with serious consequences.

CHAPTER XXI.

BLIND DEAF-MUTES.

OF absorbing interest to psychologists, physiologists, glossologists and philanthropists is the work of systematically educating blind deaf-mutes, begun many years ago by Dr. Howe, of Boston, at the Perkins Institute and Massachusetts School for the Blind and still going on there with ever-widening scope and equally gratifying results. In other parts of the world, chiefly in America, isolated cases are found in educational institutions, but nowhere else is this work systematically and regularly taken up. My aim is not to treat of this matter fully, as I have neither the space nor the knowledge requisite for such a task, but rather to call the attention of students of science to this field of comparative psychology and physiology, and to interest philanthropists in such a glorious work. I shall, therefore give a brief account of the blind deaf-mutes of the Perkins Institute, and mention a few of the isolated cases elsewhere.

LAURA BRIDGMAN.—When Charles Dickens was in Boston in 1842 he visited the Perkins Institute and had an interview with Laura Dewey Bridgman, whose education had been undertaken by Dr. Howe five years before. Dickens was so deeply impressed with Dr. Howe's success in teaching this child that he gave

a full account of her case in his "American Notes." It was the recollection of his visit to the institution and of Laura Bridgman, the best possible evidence of its usefulness which probably, quite as much as Dr. Howe's personal appeals, lead the great English author to have published in raised letters at his own expense his "Old Curiosity Shop," finished and distributed by Dr. Howe in 1869. For more than forty years after this visit Laura Bridgman continued to be one of the wonders of the educational world. She was born in New Hampshire in 1829. At two years of age, by scarlet fever, she was deprived of the senses of sight, hearing and smell, while her sense of taste was also impaired. At the time when she was taken charge of by Dr. Howe she had learned to move about some and could sew and even knit a little. Dr. Howe first devised and taught to her the manual alphabet. Then she learned to read embossed letters, next embossed words, and she learned to associate each word with its corresponding object. So far the work was merely a cultivation of memory. But at length she discovered that by this means she could have communication with others, and her whole mental life was changed. She grew happy and enjoyed herself at play like other children. She learned to know people instantly by the touch alone. In a few years she was able to be taught geography and history and mathematics. She received and answered letters from all parts of the world, was always employed and consequently always happy and contented. She learned to write a legible square hand and to read

well, and to think deeply on religious and other matters. She became a successfnl teacher of the blind and deaf. For fuller information see a work on her life and education by her teacher, Miss Lamson, Boston, 1878, and "Dickens' American Notes for General Circulation." For the pathological results of investigation into the brain of Laura Bridgman, see the papers of Dr. Henry Donaldson, of Clarke University, in the *American Journal of Psychology*, where the histological conditions are fully set forth. In the sixty-first report of the Perkins Institute, Dr. Donaldson says:

"The brain was simpler than that of a normal person, and Laura was shut off from those cross references between her several senses which usually so facilitate the acquisition of information and the process of thought. Mental association was for her limited to various phases of the dermal sensations on the minor and imperfect senses of taste and smell. Yet, from their fundamental and protean character, the dermal senses are perhaps the only ones on which alone the intellect could have lived. We are thus brought back to Sanford's conclusion as derived from the study of her writings: 'She was eccentric, not defective. She lacked certain data of thought, but not in a very marked way, the power to use what data she had.'

"One word more upon the cortex. The deficiency in the motor speech centre is mainly microscopical, the motor centre has lost some but not all of its associative connections. Histologically it was slightly

deficient. . . . Finally the deficiency was not so very great even in those areas where it was most marked; and the question arises as to what sort of occupation the cells in those areas had which would thus justify their prolonged existence. If they were thrown entirely out of function it is not easy to see how they could last so well for nearly sixty years."

HELEN KELLER.—The place in the educational world so long held by Laura Bridgman, is now occupied by another, and, if anything, a more interesting blind deaf-mute, Helen A. Keller. Her character, strength of intellect, warmth of heart, and the wonderful purity of her English are well illustrated by the following appeal for her fellow-in-affliction, Tommy Stringer, taken from the sixty-first report of the Perkins Institute, and delivered spontaneously and extempore at the kindergarten annual reception:

"I want to say something to you myself; I cannot speak very well yet, but my heart is full of thoughts, and I must express some of them. Kindness is like rain in April, it makes everything grow. Your kindness will make the little plantlets grow and blossom. Think how happy we shall all be when Tommy's mind bursts beautiful and bright from behind the clouds which hide it now. Loving thoughts for others are the most fragrant blossoms of the heart; their perfume may so fill with sweetness and joy the life of a blind and deaf and dumb child that he will never dream how full the world is of wonderful things which are hidden from him. Life is beautiful and sweet when we have that beautiful key—lan-

guage—to unlock its precious secrets. So help us educate Tommy; help us to bring light and gladness into his life, and into the lives of all little blind children."

Helen spoke with unsurpassed fluency and fervour, and her listeners were entranced and moved to tears.

To Helen, as to Laura Bridgman the power of the recognition of persons by the hand does not seem wonderful. She wonders rather that any other means are necessary. At a tea given by her in aid of the kindergarten for the blind, held in 1892, she displayed this power to a marked degree. Her friends were present in large numbers, and she recognized them all, each by the hand grasp. By this tea over $1,100 were raised, and an inexhaustible fund of sympathy and resource created. The tea was Helen's own idea, and brought from an idea to a fact by her own exertions, in spite of the discouraging opposition of her dearest friends. Divine providence was never better exemplified than in the earnest appeal of this beautiful girl to ameliorate her fellow-sufferers. She left the Perkins Institute in 1892, and is now attending a private school for the deaf in New York. Her latest triumph is the acquisition of the power to sing. By placing her fingers on the throat of a singer she is able to follow notes covering two octaves and produce them with her own voice. Her sense of touch has been so finely developed that by placing her hand upon the piano case she can discriminate notes not more than half a tone apart. Her voice is simple, like the tone of a tuning-fork, and lacks the resonance

of the normal voice due to their composite characters of tone. Helen's mind, owing to the great care taken of her education, is more developed than that of the normal girl of her age. Her sense of smell is very acute, and she is often able to recognize persons by this means alone. Her touch is so fine that she can discover the play of an individual's emotions by passing her hand over his face,

EDITH THOMAS.—The senior blind deaf-mute now in the Perkins Institute is Edith M. Thomas, and the methods adopted in her education are much the same as those used in the case of Helen Kellar. She is not an exceptionally bright child, and may therefore be taken as a fair example of what education can do for persons in this condition. Satisfactory progress has been made by her in all her studies except arithmetic, which she frankly admits that she detests. Her failure in this subject may be attributable to her lack of creative imagination, and the power to deal with abstractions in any form. She listened to the reading of Kingsley's "Water Babies" and his "Gr[illegible] Heroes" with indifference. Fairy tales and mythology excite no interest in her, as she considers such matters untrue, and much prefers Bible stories, though she has much difficulty in discriminating between biblical and mythical giants. The practical turn of her mind is constantly asserting itself. She is very self-reliant, and often when in want of a word coins one for the occasion. Meaning initials, she once asked a teacher what was her spell name, the idea being suggested to her by the monogram E.M.T., engraved upon her watch.

WILLIE ELIZABETH ROBIN AND TOMMY STRINGER. —These interesting children are in the kindergarten department of the Perkins Institute at Jamaica Plains. The one is a beautiful golden-haired girl from far-away Texas, and the other a roguish, bright-faced boy from Green County, Pa. In a few years a wonderful transformation has been made in the lives of these children. It is not long since the one was a rude little girl, shut out from all intercourse with her fellows, and the other a helpless infant, at the mercy of the world and his surroundings. A full account of the way in which Willie was transformed into a loving and affectionate child and Tommy into a responsible being, may be found in Mr. Anagnos' recent reports. Numerous interesting details may also be found in the same books with regard to Helen Keller and Edith Thomas.

In the Maryland School for the Blind, Baltimore there is a deaf, dumb and blind young man, named F. L. Smith, who was trained as a broom-maker there, and is now employed in the workshop of the institution since 1885. He is a good mechanic and has earned a comfortable living, and has a growing balance to his credit in the savings bank. At Halifax is another blind deaf-mute, named William Hulen, who is learning basket-making. He is a particularly bright and interesting pupil; he has mastered chair-caning, and has made good progress at willow-working.

One attempt to educate persons in conditions similar to those already mentioned was a failure.

Rebecca Young was admitted to the Pennsylvania Institute in 1892, and remained there one year, and had to be discharged. She was blind and almost deaf. The progress made in her education was considerable, though the material was unpromising at first. Her indulgent parents refused to allow their child to be kept away from them, and as it was thought fatal to her mental and moral development for her to return to the evil influences of her home her name was struck from the roll.

It will be observed that the term blind deaf-mute is not strictly applicable to most of the cases just enumerated, as most of them possess the power of articulation. But since the term represents the condition from which these cases have been brought I think its use in this connection justified.

Consequent upon the destruction of the senses of sight or hearing there seems to be an enormous increase in the acuteness of taste and smell. Many blind deaf-mutes possess discrimination in odours equal to that of the best breed of pointers and setters. The famous James Mitchell is a case in point. He was born blind and deaf, and his sense of touch and general sensation for the whole organism were considerably impaired. By their peculiar odour he was able not only to recognize his acquaintances. but also to form a good idea of their character. Helen Keller and Willie Elizabeth Robin have also similarly marked developments in their olfactory senses. In fact, this development is so generally found among blind deaf-mutes that its connection with their peculiar state appears to be well established.

CHAPTER XXII.

CENSUS RETURNS AND OTHER TABLES OF REFERENCE.

CENSUS returns and numerous other statistical tables have been prepared, and many and various are the deductions based upon them. Such tables are seldom made with sufficient accuracy to be of much value. Reasoning from statistical tables, besides being open to all the fallacies incident to induction and deduction, is materially affected by the loose methods employed in obtaining the data necessary. Blindness is individual in its character, and upon this, as upon most other questions, it is easy for any one to find statistics in evidence of any preconceived ideas upon the subject. I shall, therefore, confine myself to giving a few statistical tables for what they are worth, and without comment.

The number of blind in the world is variously estimated from two and a quarter millions to three and a quarter millions. It is said that of this number Russia and China have each a million; India, three hundred thousand, and the English-speaking world over one hundred thousand. Blindness is more frequent in the regions near the equator and polar circles than in the temperate zone, and the proportion of the blind to the population is found to increase uniformly from

the central temperate regions both towards the equator and towards the poles. In Egypt and Mexico and the remote northern regions, it is estimated that 10 per cent. of the population are blind; and in the temperate zones about 0.1 per cent. It is also more common in the eastern than in the western hemisphere. With these vague generalities, I dispose of the rest of the world, and pass on to the last census returns for the United States and Canada.

According to the census of 1891, there were then in Canada 3,368 blind persons—1,839 males, and 1,529 females. In Ontario there were 1,227 blind persons, of whom 158 were at school at Brantford. In the whole Dominion the proportion of the blind population to the whole population is less than one to a thousand, being about 6.5 in ten thousand.

The following table, taken from the Twenty-third Annual Report of the Ontario Institute for the Blind, shows the number of pupils in attendance there in each year since its foundation.

"Attendance for portion of year ending September 3rd, 1872:

Year.	Males.	Females.	Totals.	Year.	Males.	Females.	Totals.
1872....	20	14	34	1884..	71	69	140
1873....	44	24	68	1885..	86	74	160
1874....	66	46	112	1886..	93	71	164
1875....	89	50	139	1887..	93	62	155
1876....	84	64	148	1888..	94	62	156
1877....	76	72	148	1889..	99	68	167
1878....	91	84	175	1890..	95	69	164
1879....	100	100	200	1891..	91	67	158
1880....	105	93	198	1892..	85	70	155
1881....	103	98	201	1893..	90	64	154
1882....	94	73	167	1894..	84	66	150
1883....	88	72	160				

In the United States, according to the census of 1890, there were 50,411 blind—males, 27,983; females, 22,428—of these 3,203 were in the American institutions for the education of the blind. The following table, taken from the last report of the Pennsylvania Institute for the Blind, gives the names of institutions in the United States in 1894, and where 3,630 were in attendance in that year:

STATE.	PLACE.	NAME.	SUPERINTENDENT.
Alabama	Talladega	Academy for the Blind	Carlton Mitchell.
Alabama	Talladega	School for Negro Deaf-Mutes and Blind	J. S. Graves.
Arkansas	Little Rock	School for the Blind	W. E. Ferguson.
California	Berkeley	Inst. for the Education of the Deaf and Dumb and Blind	W. Wilkinson.
Colorado	Colo. Springs.	Inst. for the Education of the Deaf and Blind	D. C. Dudeley, A.M.
Florida	St. Augustine.	Inst. for the Deaf and the Blind	H. N. Felkel.
Georgia	Macon	Academy for the Blind	W. D. Williams.
Illinois	Jacksonville	Inst. for the Education of the Blind	Rev. W. F. Short, D.D.
Indiana	Indianapolis.	Inst. for the Education of the Blind	W. H. Glasscock.
Iowa	Vinton	College for the Blind	T. F. McCune, A.M.
Kansas	Kansas City	Inst. for the Education of the Blind	Rev. W. G. Todd.
Kentucky	Louisville	Inst. for the Education of the Blind	B. B. Huntoon.
Louisiana	Baton Rouge	Inst. for the Blind	W. H. N. Magruder, LL.D.
Maryland	Baltimore	School for the Blind	F. D. Morrison.
Maryland	Baltimore	School for Deaf Mutes and Coloured Blind	F. D. Morrison.
Massachussetts	Boston	Perkins Inst and Massachusetts School for the Blind	M. Anagnos.
Michigan	Lansing	School for the Blind	E. P. Church.
Minnesota	Faribault	School for the Blind	J. J. Dow.
Mississippi	Jackson	Inst. for the Education of the Blind	P. Fairley, M.D.
Missouri	St. Louis	School for the Blind	J. T. Sibley, A.M., M.D.
Montana	Boulder	School for Deaf and Blind	J. A. Tillinghast.
Nebraska	Nebraska City	Inst. for the Blind	Wm. Ebright.
New Mexico	Santa Fe	Asylum for the Deaf, Dumb and Blind	L. M. Larson.
New York	Batavia	Inst. for the Blind	F. R. Place.
New York	New York City	Inst. for the Blind	W. B. Wait.
North Carolina	Raleigh	Inst. for the Deaf and Dumb and Blind	W. J. Young, A.M.
Ohio	Columbus	Inst. for the Education of the Blind	S. Borrows, M.D.
Oregon	Salem	Inst. for the Blind	Rev. E. S. Bollinger

STATE.	PLACE.	NAME.	SUPERINTENDENT.
Pennsylvania...	Philadelphia..	Inst. for the Instruction of the Blind	E. E. Allen.
Pennsylvania...	Pittsburg ...	Inst. for the Blind	H. E. Jacobs.
South Carolina .	Cedar Springs	Inst. for the Blind, Deaf and Dumb	N. F. Walker.
Tennessee.....	Nashville	School for the Blind	David Lipscomb, jun.
Texas	Austin	School for the Blind	Dr. E. P. Beeton.
Texas	Austin	Inst. for the Deaf and Dumb and the Blind Coloured Youth	W. H. Holland.
Utah	Salt Lake City	Inst. University of Utah, Department for Blind	Dr. J. E. Talmage.
Virginia.....	Stanton	Inst. for the Education of the Deaf and Dumb and Blind..	T. S. Doyle.
Washington	Vancouver ...	School for Defective Youth ..	J. Watson.
West Virginia ..	Romney.....	School for the Deaf and Blind	C. H. Hill.
Wisconsin	Janesville	School for the Blind	L. S. Pease.
Wyoming	Cheyenne	Inst. for the *Blind and the Deaf and Dumb	.....

*Blind Department not yet opened.

I have inserted the foregoing table partly because it shows far better than any statistics can the wide range of the movement to educate the blind, but chiefly in order to enable those desiring further information to obtain it by writing to the superintendents of the institutes. I know from experience that all letters will be attended to and inquiries answered. The following tables, taken from a late report of the Iowa College for the Blind and prepared by its principal, T. F. McCune, shows the cost of maintenance per capita in fourteen of the largest American Institutions:

NAME OF SCHOOL.	PUPILS ENROL[illegible] FOR 1891.	[illegible]OST PER CAPITA.
New York State School....	139	$325 27
Pennsylvania School.....	177	290 27
Private Corporation—		
Ohio State School	212	282.66
Missouri State School...	107	275 56

NAME OF SCHOOL.	PUPILS ENROLLED FOR 1891.	COST PER CAPITA.
Board of Managers—		
New York City School..	243	$251 28
Private Corporations—		
Maryland.....	106	239 04
Kentucky State School..	121	236 41
Nebraska State School..	70	232 14
No Trustees—		
Indiana State School....	124	211 55
Tennessee State School..	100	200 00
Wisconsin State School..	107	198 48
State Board of Supervision—		
Michigan State School ..	117	191 40
Board of Control—		
Illinois State School	200	181 99
Advisory Board—		
Iowa State School	184	168 28

The estimates for Michigan were based upon the report of 1880.

For the same year, 1891, the cost per capita at the Ontario Institute was $271.81, it was reduced in 1894 to $267.76. Of course in making comparisons of this kind, differences in management and in locality must be carefully considered, and it is probable that slight differences in cost of maintenance may be explained in this way.

As an appropriate ending, both to this chapter and to my book, I give the record of the vote upon the resolution to employ the whole of the Congressional subsidy to the publishing of books in the New York Point. It is the last great triumph of the point

characters, and ousts forever the Roman letter. It also shows the strength of the contending factions. The New York Point prevailed and the American Braille was vanquished. But if the Stereograph does not materialize, the reign of the New York Point will be a short one; there can be no doubt that the stereotype-maker is a fact, and where the difference in cost is so great, and the difference in utility so little, even a greater change than from one to the other would be warranted.

At a meeting of the trustees of the American Printing House, held at Brantford, Ont., 1892, Dr. Sibley moved, That of the 50 per cent. of the Subsidy Fund, whose expenditure is not provided for in the by-laws, 25 per cent. be expended in the production of Braille music and 25 per cent. in the production of books in line.

Mr. H. H. Johnson, of West Virginia, moved, in substitution, That 50 per cent. of the subsidy now expended on line print be expended hereafter in the duplication of line books and in printing general literature and music in New York Point.

When the question was put upon this amendment the following was the result:

Yeas—Colorado, Georgia, Indiana, Kentucky, Maryland, Nebraska, New York City, New York State, West Virginia, Wisconsin—10.

Nays—Alabama, Florida, Illinois, Massachusetts, Mississippi, Missouri, Ohio, Pennsylvania, Tennessee —9.

THE END.